

University sustainable entrepreneurial intention: an explanatory model of the individual

Intención emprendedora sostenible universitaria: un modelo explicativo del individuo

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Abstract

Keywords:

Sustainable entrepreneurial intention; attitude; self-efficacy; motivations.

The study analyzes how attitude, self-efficacy, and individual motivations influence the sustainable entrepreneurial intention of university students. A quantitative analysis methodology was applied using the partial least squares structural equation modeling technique (PLS-SEM). The sample consisted of 284 students from universities in Tamaulipas and Nuevo León, Mexico. The results reveal that attitude, self-efficacy, and motivation have a positive and significant effect on sustainable entrepreneurial intention, with motivation, particularly altruism, emerging as the most influential factor. These findings support the development of a validated cognitive model to promote sustainable entrepreneurship. In conclusion, this study identifies measurable indicators that can assess students' propensity toward this type of entrepreneurship, providing valuable input for universities and academic programs aiming to foster a sustainability-oriented entrepreneurial mindset.

Resumen

Palabras clave:

Intención empresarial sostenible; actitud; autoeficacia; motivaciones.

El estudio analiza cómo la actitud, la autoeficacia y las motivaciones individuales influyen en la intención emprendedora sostenible de estudiantes universitarios. Se aplicó una metodología de análisis cuantitativo mediante la técnica de ecuaciones estructurales por mínimos cuadrados parciales (PLS-SEM). La muestra estuvo conformada por 284 estudiantes de universidades de Tamaulipas y Nuevo León, México. Los resultados revelan que la actitud, la autoeficacia y las motivaciones tienen un efecto positivo y significativo sobre la intención emprendedora sostenible, siendo la motivación, particularmente el altruismo, el factor más influyente. Estos resultados apoyan el desarrollo de un modelo cognitivo validado para promover el emprendimiento sostenible. En conclusión, este estudio identifica indicadores medibles que pueden evaluar la predisposición de los estudiantes hacia este tipo de emprendimiento, aportando información relevante para las universidades y los programas educativos que pretenden fomentar una mentalidad emprendedora orientada hacia la sostenibilidad.

Recibido: 18 de noviembre de 2024

Aceptado: 16 de junio de 2025

Publicado: 29 de octubre de 2025

Cómo citar: Rodríguez-Jasso, L. J., Rodríguez-Jasso, A. F., & Severino, P. (2025). University sustainable entrepreneurial intention: an explanatory model of the individual. *Acta Universitaria* 35, e4426. doi: <https://doi.org/10.15174/au.2025.4426>

Introduction

Higher education institutions have been identified as a source of entrepreneurs and have also been seen as one of the main means for the dissemination and appropriation of sustainability. In this sense, university students are an important part of sustainable entrepreneurship since educational institutions shape and encourage students in the design and development of projects which might result in the establishment of business, being a valuable way to contribute to the development of communities through the application of knowledge, skills, and creativity of the students (Betakova *et al.*, 2020; Ndofirepi, 2023).

The new generation of students has a great awareness of environmental and social issues compared to previous generations, seeking rewards that go beyond monetary issues, which could influence their entrepreneurial projects (Agu, 2021; Vuorio *et al.*, 2018). They have a higher probability of not being influenced by the objectives of traditional entrepreneurship, which is based mainly on economic factors, having the opportunity to create a new company with a sustainable vision (Gálvez-Albarracín *et al.*, 2018; Romero-Argueta *et al.*, 2020). The concept of intentional entrepreneurship implies that the more university students' perception of entrepreneurship increases and improves, the more their decision to carry it out will be strengthened following the line that has been promoted, such as sustainability (Gálvez-Albarracín *et al.*, 2018). Therefore, it is identified that university students are an appropriate sector for the analysis of the intention of sustainable entrepreneurship as an aspiration (Calderón & Pelaez-Higuera, 2024; Ndofirepi, 2023; Romero-Argueta *et al.*, 2020).

The theory of planned behavior (TPB) concept is one of the main theoretical foundations used in the explanation of entrepreneurship phenomena, including sustainable entrepreneurship (Agu, 2021; Reyes *et al.*, 2023; Romero-Argueta *et al.*, 2020). This theory is presented by Ajzen (1991) and identifies two main factors for the generation of an individual's behavioral commitment: a) intention (beliefs and perception) and b) perceived behavioral control (resources expected to be available) (Godswill, 2021). Ajzen (1991) suggests that the intention to act is shaped by attitudes, social norms, and perceived behavioral control. These first two are connected to certain beliefs and appreciations of people according to their previous experiences, while perceived behavioral control is related to the set of resources that the individual expects to have to carry out a certain activity, having a direct or indirect influence on intention (Abdelhamid, 2022; Ajzen, 1991; Rodríguez *et al.*, 2022).

Definition of sustainable entrepreneurship is cross-cutting and seeks to connect the economic, social, and environmental aspects with factors of importance in the business sector (market attention, procedures, strategies, resources) for the creation of goods and services that allow meeting business and sustainability objectives (responsible production and consumption, quality education, climate action), as well as meeting the needs of the market by reducing the environmental footprint (Godswill, 2021; Organización de las Naciones Unidas [ONU], 2021; Rodríguez *et al.*, 2023). One of the main aspects of implementing entrepreneurship is the understanding of the factors that might influence it, where the intention implies the degree of interest and effort that an individual is willing to exert to achieve a specific behavior, so it is established as the effect before the development of the behavior (i.e., the propensity to act) (Ajzen, 1991; Arru, 2019). Based on this, the definition of entrepreneurial intention can be conceived as the conviction for the creation of a business, where the individual focuses all his efforts on the conception and development of this objective so that, in a sustainable entrepreneurial intention, the individual combines all those efforts and convictions and focuses them on the commitment to sustainability (Godswill, 2021; Rodríguez *et al.*, 2022).

A sustainable entrepreneurial intention is a multidimensional cognitive phenomenon (economic, social, and environmental) that can be explained through various elements of the individual, providing excellent interpretations of behavior in different situations and combining economic, social, and environmental factors for value creation (Arru, 2019). The TPB represents one of the most widely used models for behavioral explanation, as it considers personal, social, and environmental factors at the individual level and is widely accepted for sustainable business intention (Al-Jubari, 2019; Saleem *et al.*, 2018; Yasir *et al.*, 2021). The great acceptance of the TPB for the identification of sustainable business intention is because it considers some relevant social and personal factors in the explanation of behavior toward sustainability, such as personal attitudes and perceived behavioral control (Yasir *et al.*, 2021). This perspective integrates intrinsic and extrinsic benefits, environmental values, and future effects of entrepreneurial intention toward this approach (Ali *et al.*, 2020; Vuorio *et al.*, 2018).

On the other hand, attitude as a personal evaluation (positive or negative), regarding the possible consequences and outcomes of a certain behavior, can determine an individual's intention towards that particular conduct, such as entrepreneurial behavior (Ajzen, 1991; Godswill, 2021; Hirschfeld & Wagner, 2022). In this context, it is suggested that personal values and beliefs are relevant elements of perceptions, and therefore, for future decision-making (Hwang & Griffiths, 2017). An attitude toward sustainability is conceived as a predictor of entrepreneurial intention and is essential for the implementation of sustainable actions, given that it provides a specific direction (Spagnoli *et al.*, 2015). Ajzen (1991) agrees with the prior perspective by mentioning that it is a fundamental element in generating pro-environmental behavior and sustainable entrepreneurship, by positively influencing the intention. It is suggested that an attitude towards nature facilitates the creation of companies with an environmental profile, and it boosts the establishment of sustainable actions (Sher *et al.*, 2020). Several authors have identified positive and significant relationships between attitude and sustainable entrepreneurial intention, being a relevant variable as a predictor of intention (Abdelhamid, 2022; Agu, 2021; Calderón & Pelaez-Higuera, 2024; Ndofirepi, 2023; Tehseen & Haider, 2021).

Another element of the TPB is self-efficacy (as a dimension of perceived behavioral control), which has a direct and indirect effect on behavior. Self-efficacy refers to the set of resources that the individual believes he or she has for the development of a series of activities, and one of the most usual forms in its representation is the perception of his or her abilities (Arru, 2019; Godswill, 2021). Several authors have identified a positive and significant effect of self-efficacy on the generation of a sustainable entrepreneurial intention (Calderón & Pelaez-Higuera, 2024; Godswill, 2021; Sargani *et al.*, 2020; Soomro *et al.*, 2020); nevertheless, other studies have identified a no-significative effect, as well as negative effect, suggesting that the individual cannot successfully develop sustainable entrepreneurship, becoming a being therefore a variable to consider (Agu, 2021; Ndofirepi, 2023).

Finally, individual motivation represents how a person conceives his or her existence, guiding, driving, and regulating them toward the materialization of a certain reality through specific objectives (Arru, 2019; Schwartz, 1977). A cognitive understanding of motivations allows us to explain how human beings act, guiding them or not toward what they consider correct; therefore, it serves as a strong guide for intention and behavior (Hueso *et al.*, 2021; Schwartz, 1977).

Several authors have suggested positive (Conner, 2020; Thelken & de Jong, 2020) and negative (St-Jean & Labelle, 2018) relationships between motivators and sustainable entrepreneurship, being a driver that might encourage a transformation, generating an intention that can be turned into favorable sustainable actions (Arru, 2019; Sargani *et al.*, 2020). Several influential motivations have been discussed in the literature for the promotion of a greater propensity toward sustainable entrepreneurship, combining the social, economic, and environmental approaches (Sargani *et al.*, 2020; Vuorio *et al.*, 2018). However, altruism, extrinsic and intrinsic motivation have been highlighted in the literature, complementing each other (Arru, 2019; Rodríguez *et al.*, 2022; Thelken & de Jong, 2020). Bergmark & Westman (2018) suggest that motivations (intrinsic, extrinsic, transcendent, and altruistic) are multidimensional and activate behaviors in the business and organizational sectors.

Altruism represents the most philanthropic sense of human beings, since it is the one who drives them towards the search for social and environmental care and welfare with enthusiasm, without the intention of receiving any retribution in return, shaping their intention and behavioral commitment (Rezaei *et al.*, 2019; Schwartz, 1992). Schwartz (1992) proposes a classification for values, including transcendence (altruism), which focuses on justice, social benefit, equity, generosity, and protection of nature, which are oriented towards the creation of environmental value.

On the other hand, extrinsic motivation relates to economic resources (wealth, reward) and the pursuit of personal interests (power, ambition, status, authority, social recognition, and prestige) (Sargani *et al.*, 2020), which are integrated into the classification of achievement and power (Sargani *et al.*, 2020; Schwartz, 1992). Meanwhile, intrinsic motivation (innovation, conflict resolution, interest in learning, skills, creativity, independence) is classified by Schwartz as the self-direction dimension and it is related to the creation of social values that might contribute to solving problems in the community, given that they emerge from the interior of the person (Nhemachena & Murimbika, 2018; Sargani *et al.*, 2020; Schwartz, 1992).

It is for this reason that the objective of the present study is to analyze the effect of attitude, self-efficacy, and individual motivations as influential factors on the sustainable entrepreneurial intention of university students.

Materials and methods

Method

This study develops a quantitative, cross-sectional, descriptive, and non-experimental perspective, using a causal analysis to evaluate the variables. The analysis was carried out using the partial least squares structural equation method (PLS-SEM), which is considered adequate for the evaluation of multiple regressions where the relationship between variables can be estimated at the same time, which has been used in the literature to address sustainable entrepreneurial intention (Agu, 2021; Calderón & Pelaez-Higuera, 2024; Ndofirepi, 2023; Tehseen & Haider, 2021). Likewise, this procedure facilitates the evaluation of complex models when the variables are presented in a second order, in a formative and/or reflective manner (Galván *et al.*, 2019; Rodríguez *et al.*, 2022), which is the case of the variables motivation and sustainable entrepreneurial intention analyzed in this study.

Firstly, the method of the present study involves a descriptive analysis to identify the profile of the participants, followed by an exploratory evaluation to determine the normality of the data, and then proceed to perform an exploratory and confirmatory factor analysis to determine the adequate conformation of the constructs, thus, analyzing the first order reflective measurement model by evaluating the internal consistency reliability, convergent validity, and discriminant validity of all variables. Then, the two-stage method is used for the creation of the latent variables of sustainable entrepreneurship intention and motivations in a second formative order, which will allow the evaluation of the structural model for the determination of the paths that indicate the impact, the sense, and the significance of the effect of the independent variables on the dependent variable, also incorporating the adjustment of the model to establish its explanatory relevance and its usefulness to be replicated by other studies.

Unit of analysis

Regarding the unit of analysis, university students are considered an appropriate study population for the evaluation of sustainable entrepreneurship intention (Abdelhamid, 2022; Arru, 2019; Godswill, 2021), given the entrepreneurial aspiration of these future agents of change, mainly those students who are pursuing business-related undergraduate degrees. Furthermore, the greater focus and socially responsible awareness of these young adults allow the search for business benefits to be directed not only toward the economic aspect but also to include the pursuit of social and environmental solutions at the same time (Agu, 2021; Ndofirepi, 2023). Given the probability that this population might have limited or no experience in the development of entrepreneurial activities, this may favor the reorientation of the merely economic influence of traditional entrepreneurship toward sustainable objectives (Gálvez-Albarracín *et al.*, 2018). It is identified that the study of intention, conceived as the step prior to the generation of behavior (Ajzen, 1991), should be examined by people who are in the stage of intentional entrepreneurship -that is, in the first phase of business creation, where business actions are not yet put into practice-, so university students meet this requirement, an aspect with which several authors have agreed when addressing the study of the intention of sustainable entrepreneurship (Betakova *et al.*, 2020; Calderón & Pelaez-Higuera, 2024; Reyes *et al.*, 2023; Romero-Argueta *et al.*, 2020).

The research sample focuses on university students in northeastern Mexico belonging to various institutions with a sustainable philosophy within the states of Tamaulipas and Nuevo Leon, Mexico. Regarding the study region, the state of Tamaulipas highlights in its latest State Development Plan the need for economic development with a social sense and a sustainable perspective. This is derived from the great potential that the region has in its natural resources and the need for their correct use, the necessity to address the environmental degradation generated in recent years, the concern for preserving the predominant cultural wealth, the possibility of economic growth, and the national and international competitiveness in response to global dynamism (Gobierno de Tamaulipas, 2017). In turn, the state of Nuevo León is focused on continuously carrying out actions as part of its sustainable strategies, which are aimed at benefiting the quality of life of its inhabitants, economic prosperity, and environmental protection (Gobierno de Nuevo León, 2024).

The sample involved 284 students, from an original total sample of 550 (51.6% efficient and complete response rate), registered in the academic programs Business Administration and Management, International Commerce, Administration, and Accounting. According to the finite population formula (Asociación Nacional de Universidades e Instituciones de Educación Superior [ANUIES], 2024; Rodríguez *et al.*, 2022), the recommended number of individuals is 286 (confidence coefficient = 1.96; population = 65 156; probability in favor = 0.75; probability against = 0.25; error estimate = 0.05), so the collected sample of 284 is established as adequate. Likewise, making use of the rule of ten commonly used in PLS where the number of minimum cases analyzed should be 10 multiplied by the number of paths of the model, the number collected (284) exceeds the number suggested by the rule (30 observations) (Hair *et al.*, 2017; Hannachi, 2020). Likewise, Pérez & Medrano (2010) and Nunnally & Bernstein (1994) suggest that a minimum of five observations for each item analyzed is relevant, which in this case would be a minimum of 215.

Data collection

Data collection was given through an electronic questionnaire consisting of four socio demographic questions (age, gender, major, state of origin) and 43 items intended to measure the different constructs, of which nine focus on self-efficacy, two on attitude (something permissible in PLS) (Hair *et al.*, 2017; Lloret-Segura *et al.*, 2014; Martínez & Fierro, 2018), 18 in motivations (six in altruism, six in intrinsic, and six in extrinsic), and 14 in sustainable entrepreneurial intention (six in entrepreneurial intention, and eight in sustainable goal), which were measured through a five-point Likert scale (1 = Strongly disagree; 5 = Strongly agree). Concerning the variable attitude, the variable is comprised of two items, whereas for PLS methodology provides the flexibility of evaluation through only one or two measures per variable for the generation of confirmatory estimates (Hair *et al.*, 2009, 2017; Martínez & Fierro, 2018). Tables 1a, 1b, and 1c show the operationalization of the study variables.

The application period was from November 2022 to January 2023 through electronic questionnaires (Google Forms), either sent to institutional accounts or applied in the classroom. To validate the instrument, content validation was carried out through a literature review, validation by experts through receiving observations by specialists in the subject matter and methodology, and construct validation through statistical analysis.

Table 1a. Operationalization of sustainable entrepreneurship intention

Variable: Sustainable Entrepreneurship Intention					
Conceptual definition: a multidimensional cognitive phenomenon that can be explained through various elements of the individual, providing excellent interpretations of behavior in different situations, and combining economic, social, and environmental factors for value creation (Arru, 2019).					
Variable	Conceptual definition	Operational definition	Item		Author(s)
Entrepreneurship Intention	Conviction for the creation and development of a business, where the individual focuses all his efforts on the conception and development of this objective (Godswill, 2021; Rodríguez <i>et al.</i> , 2022)	A person's real willingness to take action to create a business	I1	I consider myself ready to be an entrepreneur.	Vuorio <i>et al.</i> (2018); Rodríguez <i>et al.</i> (2022)
			I2	I would make any effort to start and create my own business.	
			I3	I am determined to start my own company in the future.	
			I4	I am seriously thinking about starting a business.	
			I5	I have the firm intention of starting a business one day.	
			I6	I will start my own business in the first year after graduation.	
Sustainable Goal	Concept that seeks to connect the economic, social, and environmental aspects with factors of importance in the business sector for the creation of goods and services that allow meeting business and sustainability objectives (Godswill, 2021; ONU, 2021; Rodríguez <i>et al.</i> , 2023)	Objective that considers the social, economic, and environmental impact in the development of business activities	MS1	If I started a business, I would have a positive impact on the most vulnerable members of society.	
			MS2	If I started a business, I would help reduce environmental problems in my community.	
			MS3	If I started a business, I would help reduce poverty problems in my community.	
			MS4	If I were to create a company, I would help generate sustainable development in my locality (contribution to the economic, social, and environmental aspects).	
			MS5	If I started a business, I would help increase social well-being in my community.	
			MS6	If I were to start a business, I would make responsible use of natural resources.	
			MS7	If I started a business, I would help increase the economic development of my community.	
			MS8	If I started a company, I would use recyclable materials.	

Source: Author's own elaboration based on the cited authors.

Table 1b. Operationalization of self-efficacy and attitude.

Variable	Conceptual definition	Operational definition	Item	Author(s)
Self-efficacy	Set of resources that the individual believes he or she has for the development of a series of activities, and one of the most usual forms in its representation is the perception of his or her abilities (Arru, 2019; Godswill, 2021).	Belief that a person has regarding his or her ability to succeed in the development of a specific activity.	A1	Compared to others, I am able to achieve most of the goals I set for myself.
			A2	When I face difficult tasks, I am certain that I can carry them out.
			A3	Overall, I think I can get the results that are important to me.
			A4	I believe I can succeed in most things I set out to do.
			A5	I am able to successfully overcome a large number of challenges.
			A6	I have the confidence to be able to perform efficiently in various tasks.
			A7	Compared to other people, I do most tasks very well.
			A8	Even when things go wrong, I can perform well.
			A9	I am able to turn challenges into opportunities.
Attitude	Personal evaluation, either positive or negative, regarding the possible consequences and outcomes of a certain behavior, which can determine an individual's intention towards that particular conduct (Ajzen, 1991; Godswill, 2021; Hirschfeld & Wagner, 2022).	The way a person usually thinks about a particular subject.	Act1	When evaluating a business opportunity, how important would you consider the company's social impact (poverty reduction, job creation, increased equality)?
			Act2	When evaluating a business opportunity, how important would you consider the company's environmental impact (use of natural resources, biodiversity protection, type of energy used, recycling activities)?

Source: Author's own elaboration based on the cited authors.

Table 1c. Operationalization of sustainable entrepreneurship intention.

Variable: Motivations					
Conceptual definition: represents how a person conceives his or her existence, guiding, driving, and regulating them toward the materialization of a certain reality through specific objectives (Arru, 2019; Schwartz, 1977).					
Variable	Conceptual definition	Operational definition	Item		Author(s)
Altruism	Philanthropic sense of human beings, since it is the one who drives them towards the search for social and environmental care and welfare with enthusiasm, without the intention of receiving any retribution in return, shaping their intention and behavioral commitment (Rezaei <i>et al.</i> , 2019; Schwartz, 1992).	The value a person places on selfless help for others and/or the environment without expecting anything in return, simply out of empathy.	Alt1	I consider important a job that allows me to preserve nature.	Vuorio <i>et al.</i> (2018); Kunttu <i>et al.</i> (2017).
			Alt2	I consider important a job that respects the environment.	
			Alt3	I consider important a job that allows me to be close to nature.	
			Alt4	I consider important a job that allows me to directly help others.	
			Alt5	I consider important a work that has social value.	
			Alt6	I consider important a job that allows me to make the world a better place.	
Intrinsic	Creation of social values that might contribute to solving problems in the community, given that they emerge from the interior of the person (Nhemachena & Murimbika, 2018; Sargani <i>et al.</i> , 2020; Schwartz, 1992).	Value that a person gives to something regardless of the benefit that can be obtained.	Int1	I consider important a job that offers me challenges.	
			Int2	I consider important a job where I can learn new things and skills.	
			Int3	I consider important a job where I have the opportunity to be creative.	
			Int4	I consider important a job where I have the opportunity to participate in decision-making.	
			Int5	I consider important a job where I can work on my own.	
			Int6	I consider important a job where I can make my own decisions.	
Extrinsic	Focus directed toward obtaining economic resources and the pursuit of personal interests (Sargani <i>et al.</i> , 2020).	Value that a person gives to something according to the external benefit (reward) that can be obtained through it.	Ext1	I consider important a job that gives me the opportunity to earn a lot of money.	
			Ext2	I consider important a well-paid job.	
			Ext3	I consider important a job where I have the opportunity to grow and advance.	
			Ext4	I consider important a job that has status and prestige.	
			Ext5	I consider important a job that most people respect.	
			Ext6	I consider important a job that provides me with high compensation or remuneration.	

Source: Author's own elaboration based on the cited authors.

Construct measurement

The scales used for the assessment of the constructs were obtained through a literature review, where the items were translated and adapted to the research context. For this, sustainable entrepreneurial intention was constituted by the measures used by Vuorio *et al.* (2018) and Rodríguez *et al.* (2022) in their studies, where the combination of entrepreneurial intention and the sustainable goal is used in a complementary manner. For the variables self-efficacy and attitude, the scale suggested by Vuorio *et al.* (2018) was developed. On the other hand, motivation scales consisting of altruism, extrinsic, and intrinsic motivations were used according to Vuorio *et al.* (2018) and Kunttu *et al.* (2017).

Results

Descriptive data analysis

The results suggest that most of the participants were women (64.8%) while 35.2% were men. This is of great relevance given the number of women interested in getting involved in economic and entrepreneurial activities, as suggested by INEGI (2021) when mentioning that female economic participation has increased in the last decade, where at least one-third of the micro, small, and medium enterprises (MSME) are led by women, while 81.2% of the productive sector is made up of independent workers. So, the analysis of the study will be evaluated mainly through their perspective, which exhibits a greater propensity towards socially responsible behaviors (Dickel & Eckard, 2020; Magano *et al.*, 2022; Rodríguez & Rodríguez, 2024). Regarding age, most of the population is between 18 and 20 years old (84.2%), which implies the major participation of students is at the undergraduate level, while only 1.5% are 24 years old or older (postgraduate). The two majors with the highest percentage of participation are Business Administration and Management (45.4%) and International Commerce (29.6%) -which is relevant for the business, commercial, and decision-making aspects to be evaluated in the individuals in this research-, followed by Accounting (21.5%) and Administration (3.5%). Finally, concerning the region of origin, 59% of the participants are from Tamaulipas, while 41% belong to Nuevo León.

Exploratory data analysis

During the initial analysis, an exploration of the normality of the data collected is carried out. Although PLS-SEM indeed provides adequate estimates even with the presence of limitations in normality, this can influence the results generated, mainly concerning the convenience of the items (Hair *et al.*, 2009, 2017). For this reason, the presence of missing data, the statistical mean, the standard deviation, and the skewness and kurtosis are evaluated. As part of the results, no missing data is presented for any measure, so the 284 observations collected are used in their entirety. Regarding the sample means, this is presented with a minimum value of 2.96 and a maximum of 4.8, inferring responses from "Midpoint" to "Strongly Agree" for all measures, while the standard deviation ranges from 0.51 to 1.339, which implies a low deviation from the mean by the responses provided, generating in this sense an acceptable variability (Hair *et al.*, 2009). Finally, concerning the distribution of the data, there is a skewness ranging from -2.696 to -0.002, which is a negative skewness that mostly loads the data to the right of the mean. Likewise, there is a kurtosis ranging from -1.054 to 7.126, which suggests the amount of concentration of the values to the mean. Despite these last measures, the figures are not far from the recommended values (± 2), so the presence of normality problems is not considered (Lloret-Segura *et al.*, 2014; Muthén & Kaplan, 1992; Rodríguez *et al.*, 2022).

First-order measurement model

To develop the first analysis, a reflective form is identified for the items of each construct, where the relevance of representativeness of each one is established, having the possibility of being maintained or eliminated according to the contribution and explanation they provide to the variable without affecting its constitution (Duarte & Amaro, 2018; Hair *et al.*, 2017). To establish the empirical appropriateness of the variables and the relevance of their items, factor analysis was carried out using SPSS in the first exploratory phase (Exploratory Factor Analysis [EFA]) and Smart PLS4 in the second confirmatory phase (Confirmatory Factor Analysis [CFA]) (Tables 2a, 2b, 2c). Among the measures evaluated in the first phase for constructs, a correlational analysis by variable, the determination of the KMO and Bartlett's sphericity was developed, obtaining the commonalities and the total variance explained by the items of the variable, the conformation of the factors, and the statistical loadings (Hair *et al.*, 2009; Lloret-Segura *et al.*, 2014). EFA results suggest an exploratory relevance for the constructs, indicating low to high correlations for entrepreneurial intention (0.397 to 0.776) and for sustainable goal (0.318 to 0.752), high correlations for extrinsic (0.713 to 0.699), low to medium correlations for self-efficacy (0.358 to 0.667) and altruism (0.406 to 0.656), and very low to medium correlations for intrinsic (0.276 to 0.532) with a bilateral significance at 0.01 for all cases (Galván *et al.*, 2019).

For the case of attitude, since this variable is composed of two items, some exploratory values cannot be generated or are not generated with adequate relevance since at least three measures are required for this purpose (Lloret-Segura *et al.*, 2014). However, the PLS methodology provides the flexibility of evaluation through only one or two measures per variable for the generation of confirmatory estimates (Hair *et al.*, 2009, 2017; Martínez & Fierro, 2018). Therefore, the property of the construct items is generated in a confirmatory manner. Regarding sample adequacy, a satisfactory KMO (0.874 to 0.921) with significant Bartlett's sphericity (<0.05) is indicated for the mentioned constructs (Hair *et al.*, 2009; Lloret-Segura, 2014), as well as commonalities considered as high for most items (>0.529) (Hair *et al.*, 2009; Rodríguez *et al.*, 2022), representing 57.81% of the total variance explained for sustainable entrepreneurship intention across two constructs (entrepreneurship intention and sustainable goal), 52.89% for self-efficacy across a single construct, and 53.48% for motivations across three constructs (altruism, intrinsic, extrinsic). Meanwhile, the factor loadings for almost all items are considered satisfactory (0.525 to 0.909), except for Int5; however, its elimination would negatively alter the results. To achieve the above data, the removal of Int6, Ext3, Ext4, and Ext5 is suggested.

In the second stage, the values are confirmed (Confirmatory Factor Analysis [CFA]) to correct possible weaknesses in the EFA and, thus, increase the validity of the results (Batista-Foguet *et al.*, 2004; Hair *et al.*, 2009). Thus, we take into consideration the loadings and the average variance extracted (AVE) for convergent validity, and Cronbach's alpha and the composite reliability (CR) index for internal consistency reliability, which allow us to establish item adequacy for the same construct (Hair *et al.*, 2019). In addition, the Fornell-Larcker criterion and the Heterotrait-Monotrait ratio (HTMT) are analyzed for discriminant validity to establish the difference between constructs (Ali & Park, 2016; Hair *et al.*, 2017; Irfan & Hassan, 2019). Concerning the CFA results, these suggest representativeness and explanation of each construct through its items, analyzing the convergent validity and internal consistency reliability. The loadings obtained to establish the bivariate contribution between items and constructs, maintain values between 0.544 to 0.915 for all items, being suggested as adequate. At the same time, the AVE is considered satisfactory for all variables (0.506 a 0.685), remaining above the recommended level (>0.5) (Hair *et al.*, 2019; Irfan & Hassan, 2019). Concerning Cronbach's Alpha (0.757 a 0.911) and CR (0.754 a 0.913), which set the lower and upper values respectively for the internal consistency of the construct, are obtained at acceptable levels (>0.700) (Cheah *et al.*, 2019; Hair *et al.*, 2019).

Regarding discriminant validity, the Fornell-Larcker criterion points out that the AVE of each construct is higher than the squared correlation of the other measures, while the HTMT is obtained in a range between 0.147 to 0.616, with lower levels than recommended (<0.90). A unique composition is assumed for all constructs (Ali & Park, 2016; Hair *et al.*, 2017). Therefore, the theoretical conformation previously established for variables can be supported, suggesting the elimination of items Ext4, Ext5, I2, Int2, Int3, and Int4. These results are exhibited in the supplementary section.

Table 2. Exploratory and confirmatory factorial analysis.

Variable	Construct	Item	EFA (*)		CFA (**)				
			Explained Variance	Loads	Loads	Cronbach's Alpha	CR	AVE	HTMT
Sustainable Entrepreneurship Intention	Entrepreneurship Intention	I1	57.81%	0.543	0.544	0.862	0.862	0.562	Yes (0.150 to 0.507).
		I2		0.761	Eliminated				
		I3		0.821	0.828				
		I4		0.891	0.703				
		I5		0.867	0.757				
		I6		0.605	0.872				
	Sustainable Goal	MS1	52.89%	0.607	0.657	0.911	0.913	0.57	Yes (0.150 to 0.641).
	Low to high correlation (0.318 to 0.752).	MS2		0.774	0.792				
		MS3		0.805	0.774				
		MS4		0.849	0.806				
		MS5		0.847	0.831				
		MS6		0.628	0.665				
		MS7		0.832	0.819				
		MS8		0.619	0.673				
	Self-efficacy	A1		0.730	0.617		0.909	0.907	Yes (0.282 to 0.512).
	Low to medium correlation (0.358 to 0.667).	A2		0.774	0.754				
		A3		0.699	0.718				
		A4		0.652	0.790				
		A5		0.821	0.737				
		A6		0.789	0.836				
		A7		0.623	0.570				
		A8		0.675	0.735				
		A9		0.758	0.722				
	Attitude	Act1	-	-	0.816	0.813	0.813	0.685	Yes (0.247 to 0.616).
	-	Act2		-	0.839				

Source: Author's own elaboration based on SPSS (*) and SmartPLS4 (**).

Table 2. Exploratory and confirmatory factorial analysis. [Continuation].

Variable	Construct	Item	EFA (*)		CFA (**)				
			Explained Variance	Loads	Loads	Cronbach's Alpha	CR	AVE	HTMT
Motivations	Altruism Low to medium correlation (0.406 to 0.656).	Alt1	53.48%	0.702	0.716	0.874	0.875	0.540	Yes
		Alt2		0.738	0.788				(0.243
		Alt3		0.601	0.628				to
		Alt4		0.682	0.739				0.641).
		Alt5		0.604	0.745				
		Alt6		0.743	0.783				
	Intrinsic Very low to medium correlation (0.276 to 0.532).	Int1		0.525	0.745	0.757	0.754	0.506	Yes
		Int2		0.608	Eliminated				(0.341
		Int3		0.530	Eliminated				to
		Int4		0.729	Eliminated				556).
		Int5		0.420	0.713				
		Int6		Eliminated	0.675				
	Extrinsic High correlation (0.713 to 0.699).	Ext1		0.909	0.679	0.837	0.825	0.547	Yes
		Ext2		0.757	0.634				(0.147
		Ext3		Eliminated	0.915				to
		Ext4		Eliminated	Eliminated				0.531).
		Ext5		Eliminated	Eliminated				
		Ext6		0.739	0.699				

Source: Author's own elaboration based on SPSS (*) and SmartPLS4 (**).

Second-order measurement model

The sustainable entrepreneurial intention and motivations variables are constituted by a series of constructs, given that a higher-order conformation of the latent variables is required before the analysis of the structural model. The two-stage method is used, evaluating in detail the multicollinearity through the variance inflation factor (VIF), and the value and significance of the generated weights, establishing the adequate conformation of the variables given their formative nature (Cenfetelli & Bassellier, 2009; Hair et al., 2019). It is mentioned that the variable measures in a formative analysis are not interchangeable, so the part that each one explains is relevant (Duarte & Amaro, 2018).

For sustainable entrepreneurial intention, the VIF is below the 3.3 recommended for each construct (EI = 1.019; SG = 1.019), so there is no significant correlation between them, an aspect that is intended in this type of analysis to establish single measures (Duarte & Amaro, 2018; García-Machado & Martínez-Ávila, 2019). Regarding the weights generated by each, EI contributes a value of 0.442 to the latent variable within the multiple regression, while SG contributes 0.838, both estimates at a significance level of less than 0.05. These values are considered moderate and high, respectively, since it is indicated that the closer to (+/-)1, the greater the contribution (García-Machado & Martínez-Ávila, 2019). Complementarily, when evaluating the loadings to estimate the absolute contribution provided by each construct independently, values above 0.500 are obtained for both constructs (EI = 0.558; SG = 0.899) significantly (<0.05), thus establishing them as adequate (Afthanorhan, 2014; Hair *et al.*, 2019). Concerning motivations, an appropriate VIF is presented for each construct (Alt = 1.328, Ext = 1.302, Int = 1.406), so that each one is established as unique. According to their weights, the measure that contributes the most is altruism (0.793), followed by intrinsic (0.312), and then extrinsic (0.053). The first two are presented at an adequate significance level (<0.05), while the third (extrinsic) exceeds the recommended measure. Therefore, the assessment of the absolute contribution is necessary, mainly for extrinsic, since the relative contribution in the multiple regression yields low non-significant participation. Thus, the resulting loadings (Alt = 0.950; Ext = 0.489; Int = 0.696) are considered adequate and significant (<0.05) to retain all the constructs through their relevance in a unique relationship with the latent variable, strengthening the pertinence in the integration of the three constructs previously marked by theory (Pérez, 1991).

Structural model assessment

To address the objective of the research, we proceed to evaluate the structural model (Table 3) to determine the effect of each of the independent variables on the dependent variable. The analysis of the VIF (internal), the values and significance of the path coefficients, and the determination of the R² coefficient are required to know the level of explanation of the dependent variable within the model. Likewise, the *f*² is analyzed to establish the size of the effect of each independent variable, and the model adjustment is generated to establish the size of the discrepancy between the estimated and observed matrices (García-Machado & Martínez-Ávila, 2019; Hair *et al.*, 2017).

Table 3. Structural model assessment.

Dependent Variable	Independent Variable	VIF	Coefficient Path	t-value	p-value	f ²	Hypothesis	¿Supported?
SEI (*) (R ² = 0.496)	Attitude (Act)	1.297	Ac→IES (0.280)	5.264	0.000	0.120	H1	Yes
	Self-efficacy (A)	1.212	Au→IES (0.254)	4.178	0.000	0.105	H2	Yes
	Motivations (M)	1.331	M→IES (0.376)	6.752	0.000	0.211	H3	Yes

Note. *SEI = Sustainable Entrepreneurial Intention.

Source: Author's own elaboration based on Smart PLS4.

Concerning the VIF, values lower than the recommended 3.3 for all variables indicate adequate levels (Cheah *et al.*, 2019; Hair *et al.*, 2017). As for the independent variables, it is indicated that motivations (0.376) generate the greatest contribution, followed by attitude (0.280), and finally self-efficacy (0.254). These effects are considered moderate and significant (<0.05) taking into consideration the minimum of 0.1 recommended (Cenfetelli & Bassellier, 2009; Hair *et al.*, 2019), with 49.6% (moderate and significant level) of the sustainable entrepreneurial intention being explained through the three exogenous variables (Hair *et al.*, 2017, 2019).

When the effect size of the independent variables (f^2) is taken into consideration, it is found that attitude (0.120) and self-efficacy (0.105) have a small effect, while motivations (0.211) have a medium effect, which might imply that motivations cause a greater change in R^2 (Hair *et al.*, 2017; Irfan & Hassan, 2019). Finally, when fitting the model, a value of 0.065 is obtained for the standardized root mean square residual (SRMR), thus establishing itself as a good fit, taking into consideration the recommended maximum value of 0.08 (García-Machado & Martínez-Ávila, 2019; Hair *et al.*, 2017). Figure 1 shows the final structural model.

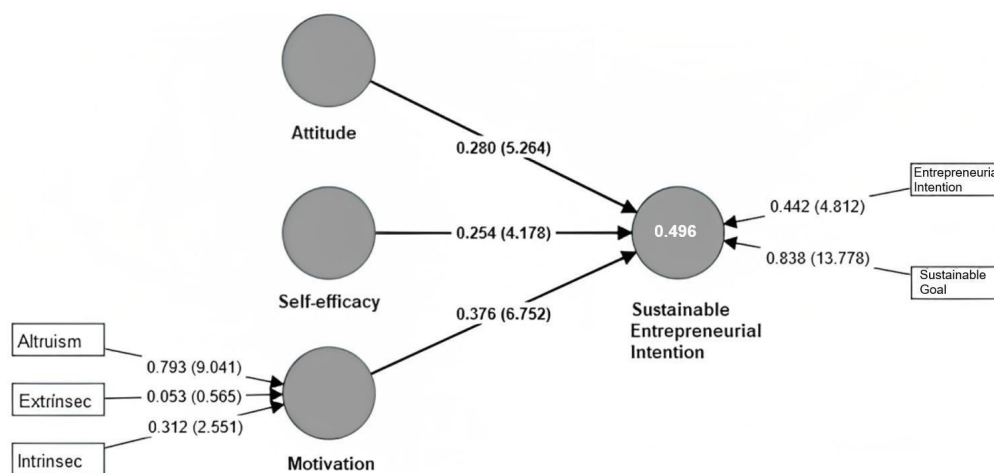


Figure 1. Structural model of sustainable entrepreneurial intention.

Source: Author's own elaboration.

Discussion

Sustainable entrepreneurship has become a fundamental element in addressing the economic, social, and environmental needs of society, contributing to the implementation of strategic solutions that allow a better quality of life (Adbelhamid, 2022; Godswill, 2021; Sargani *et al.*, 2020). The analysis of the phenomenon itself becomes relevant, but also those elements that represent an impulse towards its promotion since the understanding of these can provide a guideline towards an effective replication. Intention is perceived as the previous step towards the determination of a phenomenon, where attitude, self-efficacy, and individual motivations have an important role in suggesting an increase in the levels of intention, especially in entrepreneurial intentions (Calderón & Pelaez-Higuera, 2024; Tehseen & Haider, 2021). Therefore, the objective of this study is to establish the analysis of the effect of attitude, self-efficacy, and individual motivations as influencing factors in the intention of sustainable entrepreneurship of university students, considered from an aspirational perspective.

The study's findings suggest that attitudes, self-efficacy, and individual motivations have a positive and significant influence on sustainable entrepreneurial intention among university students, establishing in this manner a causal relationship. Within this model, attitudes are identified as key elements in the formation of entrepreneurial behavior, as they shape beliefs toward creating, developing, and implementing sustainable ventures (Godswill, 2021; Hirschfeld & Wagner, 2022; Hoda *et al.*, 2021). Previous studies have highlighted attitudes as one of the strongest predictors of sustainable entrepreneurship (Adbelhamid, 2022; Agu, 2021; Calderón & Pelaez-Higuera, 2024; Ndofirepi, 2023; Tehseen & Haider, 2021). However, unlike previous findings, this study reveals that while attitudes remain significant, they are not the most influential factor, showing a lower effect than self-efficacy and motivations within the model.

Self-efficacy reflects individuals' confidence in their abilities to engage in sustainable entrepreneurial activity (Ajzen, 1991; Arru, 2019; Godswill, 2021). Although previous studies have suggested mixed results, from positive to non-significant effects, its influence depends on the individual's perceived competence (Agu, 2021; Calderón & Pelaez-Higuera, 2024; Ndofirepi, 2023). In this study, self-efficacy shows a positive and significant influence on sustainable entrepreneurial intention, supporting findings from Godswill (2021), Sargani *et al.* (2020), Soomro *et al.* (2020), Calderón & Pelaez-Higuera (2024), and Romero-Argueta *et al.* (2020). Furthermore, individual motivations or personal values are identified as key drivers of behavior, based on expectations about the outcomes of entrepreneurial actions (Ploum *et al.*, 2018; Schwartz, 1977). However, the literature suggests varied results, positive, negative, or neutral, regarding their influence on sustainable entrepreneurship (Conner, 2020; Sher *et al.*, 2020; St-Jean & Labelle, 2018; Thelken & de Jong, 2020).

The literature identifies altruism, intrinsic motivation, and extrinsic motivation, in combination, as primary drivers of sustainable entrepreneurial intention (Arru, 2019; Sargani *et al.*, 2020; Thelken & de Jong, 2020). These findings align with Conner (2020), Sher *et al.* (2020), and Thelken & de Jong (2020), who suggest a positive and significant effect of individual values on sustainable entrepreneurship. Altruism and intrinsic motivation emerge as the most influential predictors. Extrinsic motivation also contributes as a predictor of sustainable entrepreneurship, but its explanatory effect diminishes when altruism and intrinsic motivation are present.

Hence, the proposed model suggests that in the analyzed sample, sustainable entrepreneurship intention is positively influenced by attitude, self-efficacy, and individual motivations. Among these, altruism and intrinsic motivation are the main drivers, while attitude and self-efficacy have supportive but smaller effects.

Conclusions

Educational institutions represent an actor of great importance for the generation of sustainable entrepreneurial intentions among students, especially universities, since they are responsible for preparing future agents of change before their incursion into the labor market, so that the strengthening of competencies, motivations, and attitudes may contribute to this objective. Therefore, the objective of the present study was to analyze the effect of attitude, self-efficacy, and individual motivations as influencing factors in the sustainable entrepreneurial intention of university students.

Through the applied methodology, the proposed objective was achieved, validating a model that contributes to the existing literature and cognitive models on the intention of sustainable entrepreneurship, identifying attitude, self-efficacy, and individual motivations as elements at the individual level that positively affect the increase of this type of entrepreneurship. Likewise, the implementation of a second-order model allows for an improved explanation of the variables involved, identifying the multidimensionality of the intention of sustainable entrepreneurship and the motivations of the individual, allowing a more detailed analysis of the dynamism of the constructs that conform to them. In this sense, it might help in the deepening and understanding of the origin of complex behaviors. It is worth mentioning that, due to obtaining an adequate statistical adjustment for the proposed model, it is susceptible to being replicated by other studies in other regions.

In a complementary manner, it might contribute to the public, private, and academic sectors by identifying the metrics that allow determining the degree of propensity towards sustainable entrepreneurship, helping to better understand the key stimulus elements for the generation and implementation of relevant strategies to strengthen its development. The implications for universities might include the need for constant updating and adaptation of their curricula, where the objectives must be aligned with the demands of modern society, encouraging students to take responsible action based on a concern for the environment, the economy, and society in a simultaneous and transversal manner. The transition that is required in this context invites universities, as institutions that shape tomorrow's leaders, to strengthen the awareness of students towards a sustainable perspective, transforming the traditional paradigm based mainly on the economic aspect towards a holistic approach that promotes the development of new enterprises inside business schools, addressing the global issues facing the global society.

The limitations of the present study include the sample, which was mainly oriented toward undergraduate students; therefore, it is recommended that it be expanded to include graduate students and students from other programs for future research, allowing comparative analyses to be carried out to further detail the findings. Another limitation was the study area, located in northeastern Mexico, so it is recommended to expand it to national and/or international levels and carry out comparative analyses. On the other hand, the type of non-probabilistic sampling may also be a limitation, although its use is mainly implemented for the understanding of complex phenomena and then transferred to a broader context, as is the intention of this study. Another future line of research would be to complement the proposed model by including other factors at the individual and/or contextual level that influence directly, indirectly, or as mediators in the intention of sustainable entrepreneurship, such as social norms, specific skills, culture, entrepreneurial education, and the perception of the university-industry relationship.

Acknowledgments

We recognize the support of SECIHTI for the development of this study.

Interest conflict

The authors declare that there is no conflict of interest.

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