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AN ANALYSIS OF THE BEHAVIORAL CONSTRUCTS OF SUSTAINABLE ENTREPRENEURSHIP IN BRAZILIAN UNIVERSITY STUDENTS

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ABSTRACT

Research on entrepreneurial intention stands out in the academic context and addresses several determinants related to the behavioral nature influencing entrepreneurship. Consequently, the following behavioral constructs were used for sustainable entrepreneurship: attitude towards self-employment; orientation towards sustainability; propensity to innovate; barriers and facilities for entrepreneurial activities; and entrepreneurs in the immediate family. This study aimed to analyze the influence of the behavioral constructs of sustainable entrepreneurship on the entrepreneurial intentions of university students. Based on a sample of 318 students enrolled on an administration course at the Federal University of Ceará, statistical techniques of data analysis were applied, namely factorial analysis, inferential statistics (t-test and Mann-Whitney test), logistic regression and Classification and Regression Trees (CART). Three hypotheses were constructed in this study based on the literature: (i) there is a positive influence between the orientation towards the sustainability of university students and their entrepreneurial intention, (ii) there is a positive influence between the propensity to innovate and the entrepreneurial intention of the university students, and (iii) having entrepreneurs in the immediate family contributes positively to the entrepreneurial intent of university students. It was noted that, in general, students most likely to have entrepreneurial intent are those most concerned with environmental issues, that are stimulating and original, and have immediate relatives that are entrepreneurs.

Keywords: Behavioural Constructs, Entrepreneurship, Sustainability.

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RESUMO

As pesquisas sobre intenção empreendedora se destacam no contexto acadêmico e abordam vários determinantes relacionados à natureza comportamental que influenciam o empreendedorismo. Utilizaram-se, portanto, os seguintes constructos comportamentais para o empreendedorismo sustentável: atitude em relação ao autoemprego; orientação à sustentabilidade; propensão para inovar; barreiras e facilidades às atividades empreendedoras; e familiares próximos empreendedores. Este estudo procurou analisar a influência dos constructos comportamentais do empreendedorismo sustentável na intenção empreendedora de estudantes universitários. Com base em uma amostra de 318 alunos do curso de Administração da Universidade Federal do Ceará, foram aplicadas técnicas estatísticas de análise de dados, nomeadamente, análise fatorial, estatística inferencial (teste T e teste de Mann-Whitney), regressão logística e árvore de classificação e regressão - Classification and Regression Trees (CART). Foram consideradas três hipóteses neste estudo a partir da literatura: (i) há uma influência positiva entre a orientação para a sustentabilidade dos estudantes universitários e sua intenção empreendedora, (ii) há uma influência positiva entre a propensão para inovar e a intenção empreendedora dos estudantes universitários, e (iii) ter familiares próximos empreendedores contribui positivamente para a intenção empreendedora dos estudantes universitários. Observou-se que, de modo geral, os estudantes que são mais preocupados com as questões ambientais; se consideram estimulantes e originais; e têm familiares próximos empreendedores foram, então, os que mais demonstraram ter intenção empreendedora.

Palavras-chave: *Constructos Comportamentais, Empreendedorismo, Sustentabilidade.*

1 INTRODUCTION

In recent decades, entrepreneurship has been predominant in the economic development of a country (GÜROL; ATSAN, 2006; MILLER et al., 2009; TEIXEIRA; DAVEY, 2010). According to the Global Entrepreneurship Monitor - GEM - entrepreneurship can be considered an attempt to create a business or expand an existing one by one or more people (GEM, 2012).

According to Cohen (2005), Dean and Mamulle (2007), Parrish (2008), Kuckertz and Wagner (2010) and Boszczowski and Teixeira (2012), entrepreneurship with a sustainable focus evidences the creation or expansion of company, economic, social and environmental development in favor of the advantages of sustainability, such as leadership roles to stimulate environmental protection, social responsibility, the environmental performance of the company and qualified employees involved in issues related to the importance of the impacts of their actions on the environment, among others. In this context, sustainable entrepreneurship impacts all aspects of the triple bottom line (economic, social and environmental), as proposed by Elkington (1997).

According to the European Commission (2013), education, mainly referring to higher education courses, is mainly responsible for the training of entrepreneurs (HISRICH, 1990; VERHUEL et al., 2001). Thus, Binotto, Büllau, and Roese (2004) identified that entrepreneurship must be taught, because no person is born entrepreneurial; instead, it is something one grows into.

In light of these approaches, it is emphasized that education emerges as a relevant aspect in several studies when related to entrepreneurial intention (BAE et al., 2014; DAVIDSSON, 1995; GARCÍA, 2014; GEM, 2012; LANERO et al., 2011; LÜTHJE; FRANKE, 2003; MARTIN; MCNALLY; KAY, 2013; PAÇO et al., 2011; PAIVA et al., 2018; SÁNCHEZ, 2011; TEIXEIRA, 2013; TEIXEIRA; DAVEY, 2010; WANG; WONG, 2004). Moreover, individuals with educational experiences are considered to be the most predisposed to participate in sustainability-based business implementation programs (KUCKERTZ and WAGNER, 2010).

Bearing in mind the behavioral constructs of sustainable entrepreneurship in entrepreneurial intention, a set of behavioral constructs that seek to categorize sustainable entrepreneurship are highlighted: attitude toward self-employment; orientation towards sustainability; the

propensity to innovate; barriers and facilities to entrepreneurial activities; and the occurrence of entrepreneurs in the immediate family (KIRTON, 1976; VAN PRAAG, 1997; COHEN; WINN, 2007; DEAN; MCMULLEN, 2007; KUCKERTZ; WAGNER, 2010). Thus, the following question arises: "What is the influence of the behavioral constructs of sustainable entrepreneurship on entrepreneurial intention?"

The purpose of this research is to analyze the influence of the behavioral constructs of sustainable entrepreneurship on the entrepreneurial intention of university students. By investigating research conducted within large scientific research portals such as Spell and Scielo, we can observe the scarcity of studies that align behavioral constructs with sustainable entrepreneurship to entrepreneurial intent. These phenomena are individually grounded in the empirical and conceptual literature; however, when it comes to the alignment of these phenomena, the literature is scarce or almost non-existent. The relevance of the theme reflects the importance of understanding whether university students align sustainability with entrepreneurship since the results can contribute to the establishment of policies and practices aimed at sustainable entrepreneurship in higher education institutions.

2 LITERATURE REVIEW

2.1 Entrepreneurship

Entrepreneurship is seen as a way of exploring opportunities and transforming learning into results, as it develops people and subsequently provides innovative advances. It is understood, therefore, that a person creates or expands a business through his/her entrepreneurial potential (DRUCKER, 2005; SCHUMPETER, 1982; TIMMONS; SPINELLI, 1994), and this generates something of value and results in personal satisfaction and economic and social development (HISRICH; PETERS; SHEPHERD, 2014). Dornelas (2014) considers that an individual with entrepreneurial potential has a number of specific characteristics, namely: the ability to envision the future, leadership qualities, optimism, dedication, organization, dynamism, decision-making abilities and excellent rapport with peers, among others.

In the identification of the entrepreneurial profile, the emphasis is primarily on studies in the areas of psychology and sociology. The literature on the behavior of the entrepreneur was instigated by McClelland in 1961, and then economist Schumpeter (1982) identified an entrepreneur from the association of the individual with risk, innovation and profit, linking them directly to the economic development that occurs from the innovations in the market through products and services.

Thus, several studies use behavioral theories of entrepreneurship and seek to explain the entrepreneurial intentions and attitudes, for example: Shapero and Sokol (1982), who considered the negative factors, such as unemployment, sudden changes in the life of the person – events that compel the individual and result, therefore, in behaviors directed towards entrepreneurship. Bird (1988) revealed that entrepreneurial intention is a state of mind, a goal, and can be affected by several situations, such as abilities, personality traits, family and social surroundings. Similarly, Krueger and Carsrud (1993) and Krueger and Brazeal (1994) emphasized personality traits, demographic factors and attitudinal aspects – with a greater flexibility to external factors, since the greatest predictor of behavior is intention.

Davidsson (1995) related personal variables, including age, gender, education, life experience and lifestyle changes with a variety of attitudes that influence entrepreneurial intent. In turn, Carvalho and González (2006) proposed a theoretical model to improve the inclusion of a number of factors related to personality traits, such as the locus of control, ambiguity tolerance, self-confidence, risk propensity and ability to innovate, unemployment, obstacles and barriers,

technological developments and macroeconomic stability, among others. Reynolds et al. (2002), Davidsson (1995), Teixeira and Davey (2010), Van Der Zwan, Thurik and Grilo (2010), Teixeira and Forte (2011) and Teixeira (2013) have shown that individuals who have family members with their own business tend to have entrepreneurial intentions.

For Krueger and Carsrud (1993), Thompson (2009), Teixeira and Davey (2010) and Paiva et al. (2018), numerous theoretical models are based on entrepreneurial intention, and contribute to predicting potential entrepreneurs, thus highlighting the positive impact of these people on the economy and society as a whole. Along the same vein, it is possible to emphasize that individual entrepreneurial perceptions affect attitudes towards self-employment. Ajzen (1991) is of the view, therefore, that entrepreneurial intention is expressed prior to the appearance of genuine entrepreneurial behaviors. The intention refers to the state in which the person has the intention to achieve something, be it the creation of a new company or the expansion of one that already exists (BIRD, 1988; KRUEGER; CARSRUD, 1993; DAVIDSSON, 1995).

The individual's intention for entrepreneurship is evidenced in the literature because it is influenced by many factors, namely: time, cooperation with other people, the propensity to innovate, financial resources and skills, among others. Furthermore, it can represent, in turn, the behavioral control held by the individual, which may be directing them towards entrepreneurial activities (AJZEN, 1991; DAVIDSSON, 1995; TEIXEIRA; DAVEY, 2010; TEIXEIRA, 2013). Other factors that may also influence entrepreneurial intent are professional experience, gender, age, competence, psychological characteristics and entrepreneurs in the immediate family (HISRICH; LANGAN-FOX; GRANT, 2007; KUCKERTZ; WAGNER, 2010; SCHULTZ; OSKAMP, 1996).

2.2 Behavioral Constructs of Sustainable Entrepreneurship in Entrepreneurial Intention

An entrepreneurship focused on sustainable development is supported by aspects such as innovation, sustainability and attitude towards self-employment (SCHALTEGGER, 2002). Cohen and Winn (2007), Dean and Mamulle (2007) and Parrish (2008) point out that when the individual focuses on sustainability, they obtain several positive results for society, such as products and services with an environmental and social focus, the creation of value, the improvement of social welfare and the reduction of poverty. Sustainability is at the heart of the structure, operation and management of a business, and is based above all on economic, social and environmental values.

The main measures used as determinants of sustainable entrepreneurship in this study are based on a set of items to measure certain traits, such as the orientation towards sustainability; attitude towards self-employment; propensity to innovate; barriers and facilities for entrepreneurial activities; and future entrepreneurs (COHEN; WINN, 2007; DEAN; MCMULLEN, 2007; KIRTON, 1976; KUCKERTZ; WAGNER, 2010; VAN PRAAG, 1997).

In agreement with the studies of Zahra et al. (2009) and Kuckertz and Wagner (2010), it can be emphasized that entrepreneurship directed towards sustainability is not easy to measure due to the absence of relevant measures that align entrepreneurship with sustainability. Kuckertz and Wagner (2010) relate sustainable orientation to students' entrepreneurial intent and Spence et al. (2008) emphasize that if individuals are highly oriented towards sustainability and intend to become self-employed, they tend to incorporate aspects of sustainability when undertaking such an operation. Because of this, the following hypothesis arises:

H_1. There is a positive influence between the orientation towards sustainability in university students and their entrepreneurial intention.

In addition, Shumpeter (1934), Kirton (1976), Taylor (1989), Carland, Carland and Hoy (1992), Lüthje and Franke (2003), Lee et al. (2006), Zawislak (2007), Teixeira and Davey (2010),

Teixeira and Forte (2011) all consider that the innovative spirit is a determining factor in awakening an individual's entrepreneurial intention. From Kirton's (1976) perspective, the propensity for innovation is explained through the Kirton-Adaption-Innovation (KAI) index, an instrument that measures how stimulating the individual is, their ability to develop new ideas and their willingness to innovate.

Innovation is an essential characteristic in an entrepreneur (SCHUMPETER, 1982) since it is a psychological characteristic associated with entrepreneurial behavior (THOMPSON, 2009). In turn, Taylor (1989), Robinson, Huefner and Hunter (1991) and Ho and Koh (1992) have identified that the more the individual is likely to innovate, the higher their entrepreneurial intention. Therefore, another hypothesis is proposed:

H_2. There is a positive influence between the propensity to innovate and the entrepreneurial intention of university students.

Another aspect worth mentioning is of that found in studies such as Reynolds et al. (2001), Davidsson (1995), Teixeira and Davey (2010), Van Der Zwan, Thurik and Grilo (2010) and Teixeira and Forte (2011); individuals who have entrepreneurs in their immediate family have entrepreneurial intentions. In this analysis, the entrepreneurial intention of university students is considered. De Wit (1993), Van Praag (1997) and Noorderhaven et al. (2003) all revealed evidence that supports the positive influence of entrepreneurial intention in individuals with self-employed parents. Thus, another hypothesis is being tested in this study:

H_3. Having entrepreneurs in one's immediate family positively contributes to entrepreneurial intention in university students.

The perspectives of Teixeira and Davey (2010), Texeira and Forte (2011) and GEM (2012) all address differences in entrepreneurial intention due to cultural factors inherent in the characteristics of each country. The hypotheses of this study will be tested and accepted or rejected to verify the influence of behavioral constructs of sustainable entrepreneurship in the entrepreneurship intention of university students.

In the face of these discussions corroborated by authors and strongly based on the extant literature, Table 1 groups the theoretical approaches supporting the empirical research.

CONSTRUCTS	DESCRIPTION	AUTHORS	HYPOTHESIS
Sustainability orientation	Influence of sustainable orientation on the entrepreneurial intention of the university student.	Schaltegger (2002), Seelos, Ganly e Mair (2006), Cohen e Winn (2007), Dean e Mamulle (2007), Spence et al. (2008), Parrish (2008), Zahra et al. (2009), Kuckertz e Wagner (2010) e GEM (2012).	**H_1:** There is a positive influence between the orientation towards sustainability in university students and their entrepreneurial intention.
Propensity to innovate	A cognitive ability facilitating a student's ability to innovate, be stimulated and develop new ideas.	Shumpeter (1934), Kirton (1976), Taylor (1989), Carland, Carland e Hoy (1992), Davidsson (1995), Lüthje e Franke (2003), Lee et al. (2006), Teixeira e Davey (2010), Teixeira e Forte (2011).	**H_2:** There is a positive influence between the propensity to innovate and the entrepreneurial intention of university students.
Entrepreneurs in the immediate family	Determining how much the student with entrepreneurial parents intends to undertake.	De Wit (1993), Van Praag (1997), Reynolds et al. (2001), Noorderhaven et al. (2003), Van Der Zwan et al. (2010), Teixeira e Davey (2010) e Teixeira e Forte (2011) e Teixeira (2013).	**H_3:** Having entrepreneurs in one's immediate family positively contributes to entrepreneurial intention in university students.

Table 1 - Theoretical support for research and formulated hypotheses
Source: Elaborated on by the authors.

3 METHODOLOGY

The classification proposed for this study, originally by Collis and Hussey (2005), is considered to be quantitative research of a descriptive nature, since it is based on the description of a given population, as supported by a basic quantitative analytical approach (COLLIS; HUSSEY, 2005), seeking to analyze the influence of the behavioral constructs of sustainable entrepreneurship on the entrepreneurial intention of university students.

Using an intentional survey that satisfies the purpose of this study, primary data were obtained, and defined as original and unpublished by university students (HAIR et al., 2009). For data collection, a questionnaire was elaborated and applied to students from German universities – Munich, Würzburg and Strasbourg (KUCKERTZ; WAGNER, 2010). The chosen population was students enrolled on the administration course at the Federal University of Ceará.

The administration course, using the evidence of Paço et al. (2011), presents a wide incidence of studies and practices related to entrepreneurship and can contribute significantly to the formation of entrepreneurs, which supports the justification of the choice of this course for the chosen population. For this research, we took into account the methodology applied by Kuckertz and Wagner (2010), adopting a set of items that measure five behavioral constructs of sustainable entrepreneurship: attitude towards self-employment; orientation towards sustainability; propensity to innovate; barriers and facilities for entrepreneurial activities; and entrepreneurs in the immediate family.

Additionally, the sociodemographic characteristics of the respondents were used as control variables: gender, age, marital status, year in which they entered the university and the semester they attend. Regarding the translation of the research instrument into Portuguese, this was conducted by collaborating with an English-speaking interpreter, a Canadian professor who lives in Brazil and is fluent in English and Portuguese (Brazil). Structured across 35 items, the data collection instrument consisted of closed questions with responses represented on a five-point Likert scale, ranging from 1 “totally disagree” to 5 “strongly agree.” The dependent variable used to identify whether or not the student has entrepreneurial intention was the item “self-employment or the intention of becoming self-employed in the next 5 years.” Next, we discuss the five behavioral constructs of sustainable entrepreneurship, defined through independent variables that seek to predict the entrepreneurial intention of university students.

The first construct, supported by this research, is related to the attitude towards self-employment, being highlighted in the literature as a determining factor for entrepreneurial activities. However, it seeks to illuminate how much the university student prefers to work on their own than with someone else (HISRICH; LANGAN-FOX; GRANT, 2007; KUCKERTZ; WAGNER, 2010). The second construct emphasizes the orientation towards sustainability, the leadership role of the individual for environmental protection and social responsibility, in which the perceived advantages of sustainability stand out. It is related, therefore, to the areas of environmental psychology, social and environmental entrepreneurship and sustainability management (KUCKERTZ; WAGNER, 2010).

The third construct, propensity to innovate, is focused on the cognitive abilities of the individual, with its interpretation based on the reduced version of Kirton-Adaption-Innovation (KAI), which identifies an individual’s propensity to innovate. This version has been used in a selection of empirical studies examining the propensity to innovate and is thus widely relevant (KIRTON, 1976; TAYLOR, 1989; FOXALL; HACKETT, 1992; MARCATI; GUIDO; PELUSO, 2008; KUCKERTZ; WAGNER, 2010). The fourth construct points to the contextual factors (facilities and barriers perceived by individuals), which analyze the university student’s perception of how much governments, banks and laws can support the creation of new companies (KUCKERTZ; WAGNER,

2010). The fifth is related to entrepreneurs in one's immediate family, revealing how the influence of entrepreneurial parents on the entrepreneurial intention of university students occurs (KUCKERTZ; WAGNER, 2010) (Table 2).

Construct	Item	Question
Attitude towards self-employment	1	"I am self-employed or intend to become self-employed within the next 5 years."
	2	"I'd rather be my own boss than have a secure and stable job."
	3	"I can only make a lot of money if I have my own company."
	4	"I would rather start a new business than be the manager of an existing one."
Orientation towards sustainability	5	"Brazilian companies should play a leading role in environmental protection."
	6	"Companies that are environmentally oriented are more likely to recruit and retain qualified employees."
	7	"The environmental performance of a company is increasingly important for funding."
	8	"Social responsibility must be part of the fundamentals of every company."
	9	"Environmental problems are one of the biggest challenges for our society."
	10	"Entrepreneurs and businesses need to take on greater social responsibility."
Propensity to innovate	11	"When I have an established purpose, it is always on my mind."
	12	"I'd rather create than improve."
	13	"I have new perspectives and creative ideas for old problems."
	14	"I can stand out against the group's opinion."
	15	"I'm a stimulating person."
	16	"I have original ideas."
	17	"I spread my ideas."
	18	"Established routines change at the right time."
	19	"I prefer gradual change over radical."
	20	"I deal with several new ideas at the same time."
	21	"I'd rather work with one problem at a time than with multiple problems at the same time."
	22	"I often do different activities during the workday."
	23	"I need stimuli for frequent changes to occur."
Facilities and barriers to entrepreneurship	24	"Banks do not easily give loans to start-up businesses."
	25	"State laws (rules and regulations) adversely affect the management/creation of a business."
	26	"It's hard to come up with an idea to open an innovative business in the marketplace."
	27	"Entrepreneurs have a positive image in society."
	28	"Consulting and qualified support services for new companies are available in the market."
	29	"The creative atmosphere at the university inspires the development of ideas for me to open new businesses."

Table 2 - Items of the behavioral constructs of sustainable entrepreneurship
Source: Elaborated on by the authors.

The questionnaire was applied in person in December 2015, with students from all semesters, from the first to the tenth, enrolled on the administration course at the Federal University of Ceará. With a population of 847 students, a total of 318 students were reached, approximately 38% of the population, meeting the sample requirements for the methodological procedures in which Hair et al. (2009) consider 5 respondents as a minimum for each scale variable.

The statistical techniques used in this research are structured in five stages: i) descrip-

tive analysis; ii) factor analysis to reduce the number of variables (substitute variable criteria); iii) inferential statistics (t-test and Mann-Whitney test); iv) logistic regression; and v) Classification and Regression Trees (CART). Statistical analyses of the responses obtained from college students were processed using the Statistical Package for Social Sciences (SPSS) version 18.0 and R (A language and environment for statistical computing) software for descriptive, inferential statistics and multivariate data analysis.

4 ANALYSIS AND DISCUSSION OF RESULTS

4.1 Sample profile

Regarding the profile of the sample, there are 166 male students, representing 57.2% of the sample, of which 85 have entrepreneurial intentions and 81 do not. Moreover, there are 152 female students (47.8%) in the sample, of these 65 have entrepreneurial intentions and 87 do not. In the sample of 318 students, a total of 150 have entrepreneurial intentions, most of whom are men (see Table 3).

		Entrepreneurial intention		Total	Chi-squared
		No	Yes		
Gender	Male	81	85	166	0.163
		48.8%	51.2%	100.0%	
	Female	87	65	152	
		57.2%	42.8%	100.0%	
Total		168	150	318	
		52.8%	47.2%	100.0%	

Table 3 - Relationship of entrepreneurial intention to the students and their gender
Source: Elaborated on by the authors.

Considering the relationship between self-employed parents and entrepreneurial intention in university students, 155 have entrepreneurial parents, and of these, 93 have entrepreneurial intention (60%) but 63 do not (40%); 88 students do not have entrepreneurial parents. Of these, 56 students have no entrepreneurial intention (63.6%) but 32 do (36.4%). Students with parents who have worked for themselves, but who have employed no other individuals, total 75 (50 of these students have no entrepreneurial intention; 66.7%) (see Table 4).

		Entrepreneurial intention		Total	Chi-squared
		No	Yes		
My Parents Work for Themselves	Yes	62	93	155	0.000
		40.0%	60.0%	100.0%	
	No, it never worked	56	32	88	
		63.6%	36.4%	100.0%	
	No, but it already worked	50	25	75	
		66.7%	33.3%	100.0%	
Total		168	150	318	
		52.8%	47.2%	100.0%	

Table 4 - Relationship between the entrepreneurial intention of students and their self-employed parents
Source: Elaborated on by the authors.

The results show that there is a statistically significant association between entrepreneurial intention and the fact that parents work or have worked for themselves (a variable called close entrepreneurial relatives) since the significance of the chi-square test was less than 0.05. Such consideration reveals evidence for the acceptance of $\mathbf{H}_3$; having entrepreneurs in one's immediate family positively contributes to the entrepreneurial intention of university students.

The average age of the sample is 23 years of age, ranging from 17 to 57 years; 78% is aged between 17 and 25 years. In addition, there are 272 single students (85.5%); 43 married (13.5%); and 3 divorced (0.9%). Regarding the year students entered the university, 47.7% of the sample entered between 1997 and 2012, and 50.3% between 2013 and 2015. Additionally, 50 students are from the first semester and 42 students are from the second, totaling 28.9% of the sample. Meanwhile, the semesters that obtained the fewest respondents were the tenth with 14 (4.4%); and seventh with 20 (6.3%) students.

4.2 Factor analysis results

From the factor analysis of the constructs involving a set of sustainable entrepreneurship items – attitude towards self-employment; orientation towards sustainability; propensity to innovate; and barriers and facilities to entrepreneurial activities – the results are evidenced for each construct, extracting the largest factor loading (the eigenvalue of each factor), which will be considered as the substitute variable (possessing greater explanatory power in the construct) (COHEN; WINN, 2007; DEAN; MCMULLEN, 2007; KIRTON, 1976; KUCKERTZ; WAGNER, 2010).

The first construct, attitude towards self-employment, presents a Kaiser-Meyer-Olkin (KMO) value of 0.588 and a 0.000 significance level for Bartlett's sphericity test. These results indicate the suitability of the sample for the use of factor analysis in this construct since the KMO was greater than 0.5 and Bartlett's sphericity test showed an interior significance level of 0.05. Item 4, "I would rather start a new company than be the manager of an existing one", has a higher factorial loading, so it was chosen as a substitute variable (0.847 factor loading). This construct holds 58.031% of the explained variance (see Table 5).

Item	Factor loading	Communalities
4	**0.847**	**0.717**
2	0.773	0.598
3	0.653	0.426

Table 5 - Factor analysis of the self-employment attitude construct
Source: Elaborated on by the authors.

In reference to the second construct, sustainability orientation, it achieved a KMO of 0.762 and a significance level for Bartlett's sphericity test of 0.000, observing its division into two factors, one related to environmental protection (item 10: "Entrepreneurs and companies need to assume greater social responsibility"; 0.837 factor loading), and the other to the advantage of sustainability (item 6: "Companies that are environmentally oriented find it easier to recruit and retain qualified employees"; 0.851 factor loading), with 61.11% of the explained variance (as seen in Table 6).

Item	Factor loading		Communalities
	Environmental protection	Advantage of sustainability	
10	**0.837**		**0.702**
9	0.748		0.565
8	0.735		0.558
5	0.639		0.487
6		**0.851**	**0.726**
7		0.764	0.629

Table 6 - Factor analysis of the sustainability orientation construct
Source: Elaborated on by the authors.

The third construct, propensity to innovate, with a KMO of 0.667 and 0.000 significance for Bartlett's sphericity test, is divided into 5 factors: stimulus and originality, whose substitute variable was item 15 ("I am a stimulating person"; 0.715 factor loading); focus and compliance, the substitute of which was item 21 ("I prefer to work with one problem at a time rather than several problems at the same time"; 0.764 factor loading); dynamism and intensity, for which item 20 acted as the substitute variable ("I deal with several new ideas at the same time"; 0.698 factor loading); determination and creativity, for which item 11 was substituted ("When I have an established purpose, it is always on my mind"; 0.790 factor loading); and opportunity and assertiveness, whose substitute was item 18 ("Established routines are changed at the right time"; 0.715 factor loading). The variance explained in the construct is 56.68% (see Table 7).

Item	Factor loading					Communalities
	Stimulus and originality	Focus and compliance	Dynamism and intensity	Determination and creativity	Opportunity and assertiveness	
15	**0.715**					**0.570**
16	0.706					0.615
17	0.652					0.609
21		**0.764**				**0.667**
19		0.697				0.506
23		0.575				0.533
20			**0.698**			**0.575**
22			0.572			0.406
13			0.566			0.584
11				**0.790**		**0.629**
12				0.755		0.578
18					**0.715**	**0.590**
14					0.656	0.506

Table 7 - Factor analysis of the propensity to innovate construct
Source: Elaborated on by the authors.

The fourth construct, barriers and facilities for entrepreneurial activities, has a KMO of 0.541 and a significance level for Bartlett's sphericity test of 0.000. This construct was divided into two factors, in which the first highlights the perceived barriers to entrepreneurial activities; removing item 25 ("State Laws (rules and regulations) are adverse to the management/creation of a company"; 0.762 factor loading) as a substitute variable, and the second, item 28, considers entrepreneurship facilities ("Consulting and qualified support services for new companies are available in the market"; 0.748 factor loading) being the substitute variable. The variance explained in this construct is 46.68% (Table 8).

Item	Factor loading		Communalities
	Barriers to entrepreneurship	Facilities for entrepreneurship	
25	**0.762**		**0.581**
24	0.733		0.541
26	0.528		0.299
28		**0.748**	**0.591**
29		0.631	0.419
27		0.577	0.370

Table 8 - Factor analysis of the barriers and facilities to entrepreneurial activities construct
Source: Elaborated on by the authors.

It should be noted that all items highlighted across Tables 5 to 8 were chosen to represent the original constructs alluded to by the theoretical framework since they present the greatest load within each of the factors. This approach is called the substitute variable criteria in the literature (MALHOTRA, 2006). Moreover, it is noteworthy that in all analyses the observed value for the KMO was greater than 0.5, and Bartlett's sphericity test was significant at a level of 0.05. Both highlight the suitability of the sample to perform the factor analysis, the KMO being a measure for the common variance between the variables and Bartlett's test evaluating the null hypothesis that there are no correlations between the variables (HAIR et al., 2009).

4.3 Comparison of sustainable entrepreneurship behaviors according to college students' entrepreneurial intention

In this analysis, the hypothesis test is performed to compare the level of agreement between students who have entrepreneurial intention and those who do not, considering the dependent variable ("self-employed or have the intention to become self-employed within the next 5 years") in the independent variables extracted from each factor.

In the analysis of the comparison between the groups, the t-test and the Mann-Whitney test are highlighted, both identifying significant differences to values lower than 0.05 (considered as a threshold in this research) (Table 9).

Construct	Entrepreneurial intention	Mean	Standard deviation	t-test	Mann-Whitney test
Attitude towards self-employment	**No**	**2.679**	**1.074**	**0.000**	**0.000**
	Yes	**3.240**	**1.053**		
Environmental protection	No	3.25	.965	0.106	0.107
	Yes	3.43	.979		
Advantage of sustainability	No	4.68	.582	0.355	0.458
	Yes	4.61	.673		
Determination and creativity	**No**	**3.51**	**1.072**	**0.049**	**0.040**
	Yes	**3.75**	**1.044**		
Stimulus and originality	**No**	**3.44**	**.873**	**0.005**	**0.011**
	Yes	**3.70**	**.740**		
Opportunity and assertiveness	No	3.75	.824	0.156	0.209
	Yes	3.87	.708		

Dynamism and intensity	No	3.40	.884	0.100	0.051
	Yes	3.58	.012		
Focus and compliance	No	3.75	1.087	0.642	0.630
	Yes	3.81	1.079		
Barriers to entrepreneurship	**No**	**3.16**	**.981**	**0.002**	**0.001**
	Yes	**3.51**	**1.047**		
Facilities for entrepreneurship	No	2.82	1.005	0.299	0.337
	Yes	2.94	1.025		

Table 9 - Comparison of sustainable entrepreneurship behaviors
Source: Elaborated on by the authors.

Attitude towards self-employment has a t-test value of 0.000, a Mann Whitney value of 0.000 and a mean of 3.240 related to entrepreneurial intention. There is strong evidence to point out that individuals who intend to start their own businesses would rather set up a business than manage an existing one. This highlights the relationship between entrepreneurial intention and attitude towards self-employment, as verified in the study by Hisrich, Langan-Fox, and Grant (2007).

Regarding the propensity to innovate, the factors of determination and creativity and stimulus and originality presented higher averages for students with entrepreneurial intention with significance levels, respectively, of 0.049 and 0.005 for the t-test and 0.040 and 0.01 for the Mann-Whitney test. This supports $\mathbf{H}_2$, as there is a positive influence between the propensity to innovate and the entrepreneurial intent of university students, corroborating the findings of De Wit (1993), Van Praag (1997), Reynolds *et al.* (2001), Davidsson (1995), Teixeira and Davey (2010), Van Der Zwan, Thurik and Grilo (2010) and Teixeira and Forte (2011).

Considering the barriers to entrepreneurship, we have a t-test value of 0.002; Mann Whitney test value of 0.002; and a mean of 3.51 for the entrepreneurial intention of university students. Given these results, the more students demonstrate this intention, the more they encounter the existing barriers to entrepreneurial practices, which is in line with Van Stel and Storey (2004).

4.4 Results of multivariate analysis

From the logistic regression analysis, the independent behavioral and sociodemographic variables are used to predict the dependent variable: "I am self-employed or intend to become self-employed in the next 5 years" in the model employed in this study. This analysis supports the viability of the model, as well as highlighting its significant aspects to evaluate the hypotheses. Table 10 shows the results of the logistic regression, considering the most significant variables (p-values less than 0.1) used for the suitability of the variable in the model.

Variable	B	Sig.	Exp(B)
Attitude towards self-employment	**0.365**	**0.004**	**10.441**
Environmental protection	0.141	0.297	10.152
Advantage of sustainability	-0.247	0.274	0.781
Determination and creativity	0.153	0.229	10.165
Stimulus and originality	**0.363**	**0.030**	**10.438**
Opportunity and assertiveness	0.212	0.231	10.236
Dynamism and intensity	0.206	0.142	10.229
Focus and compliance	0.014	0.913	10.014
Barriers to entrepreneurship	**0.281**	**0.041**	**10.324**

Facilities for entrepreneurship	0.076	0.555	10.079
Parents don't work for themselves	**-0.877**	**0.005**	**0.416**
Parents are not self-employed, but have been in the past	**-0.950**	**0.004**	**0.387**
Gender (Female)	-0.274	0.320	0.761
Age	0.004	0.884	10.004
Marital Status (Married)	0.617	0.165	10.854
Marital Status (Separated/Divorced)	-0.829	0.553	0.437
Year	0.005	0.780	10.005
Semester	-0.066	0.198	0.936
Constant	-140.955	0.693	0.000

Table 10 - Logistic regression analysis of model variables
Source: Elaborated on by the authors.

Thus, we can highlight some findings: the attitude towards self-employment allows us to infer the relationship between the entrepreneurial intentions of university students and the preference of creating a new company over managing an existing one, which may consider that there is an influence between the entrepreneurial intention of university students and their attitudes towards self-employment (p-value 0.004). This result is in line with what was observed in Table 9 (t and Mann-Whitney tests), in which a statistically significant difference was observed for attitude towards self-employment among students with and without entrepreneurial intention, with students with entrepreneurial intention having the highest observed average.

Regarding **H_1:** There is a positive influence between the sustainability orientation of university students and their entrepreneurial intention; environmental protection (p-value of 0.297) and the sustainability advantage (p-value of 0.274) were not relevant in the adopted model. Consequently, it can be highlighted that these coefficients were not statistically significant. In this sense, it is emphasized that, at least for this analysis, there is no evidence to support this hypothesis. Thus, the results point to the fact that a greater orientation towards aspects related to sustainability and the environment is not necessarily linked to an entrepreneurial posture.

Concerning **H_2:** There is a positive influence between the propensity to innovate and the entrepreneurial intentions of university students, highlighting personality factors such as being stimulating and original (p-value of 0.030) as statistically significant in the logistic regression, which allows us to infer that the more a person feels stimulating and original, the greater their entrepreneurial intention will be. This, in turn, supports **H_2** from this research. It is noteworthy that other factors from this behavioral construct (sustainable entrepreneurship: determination and creativity; opportunity and assertiveness; dynamism and intensity; and focus and conformity) had no significant influence on the model, which can infer the entrepreneurial intentions of the students who compose it. The sample is influenced only by its stimulus and originality, but not by its creativity, assertiveness or dynamism.

Regarding **H_3:** Having entrepreneurs in one's immediate family positively contributes to the entrepreneurial intention of university students. In this sense, the item "Parents are not self-employed" stands out, as it has a significant coefficient of 0.005 and B of -0.877. This negative value denotes that students whose parents are not self-employed have less entrepreneurial intent compared to students who do.

It is also worth noting that: "Parents are not self-employed, but have been in the past", presented a significance coefficient of 0.004 and B of -0.950; that is, students who previously had entrepreneurial parents also had lower entrepreneurial intention than those with entrepreneurial parents. Given this, it is emphasized that when the immediate family of college students are

entrepreneurs, the entrepreneurial intentions of these university students are greater. Thus, the evidence of $\mathbf{H}_3$ in this research is accepted.

Logistic regression analysis presented Nagelkerke R^2 of 0.223, which indicates that the regression is acceptable in explaining the importance of independent variables regarding the dependent one. The likelihood ratio value (p of 0.000) reinforces the veracity and viability of the applied model, as well as the high explanatory power of the analyses discussed previously. In this context, the logistic regression analysis verified the non-acceptance and rejection of $\mathbf{H}_1$; and the acceptance of hypotheses $\mathbf{H}_2$ and $\mathbf{H}_3$.

Sociodemographic variables, namely gender, age, marital status and semester, had no significant influence on the entrepreneurial intention of college students. Considering the use of another assessment method to highlight the hypotheses raised, such as to support the adopted model, CART was used. The CART method, from the perspective of Rebouças (2011), allows quality data interpretation, presents good predictive capacity and shows interactions between variables. This research seeks to reveal the structures explaining the influence of behavioral aspects of sustainable entrepreneurship on the entrepreneurial intention of university students.

Classification trees are composed of nodes – subsets resulting from the application of data division rules about the dependent variable. The root of the classification tree is characterized by being the first node of the analysis, which stands out as the complete dataset, while the leaves are the terminal nodes. Each descending node is generated by the division of a node, and the ascending node is the node that originated from the descendant (FERREIRA; SOARES; CRUZ, 2001). This statistical technique is illustrated in Figure 1, considered through the most important nodes that seek to highlight the hypotheses raised in this study, and so it is possible to better understand how behavioral constructs related to sustainable entrepreneurship are associated with the entrepreneurial intention of university students.

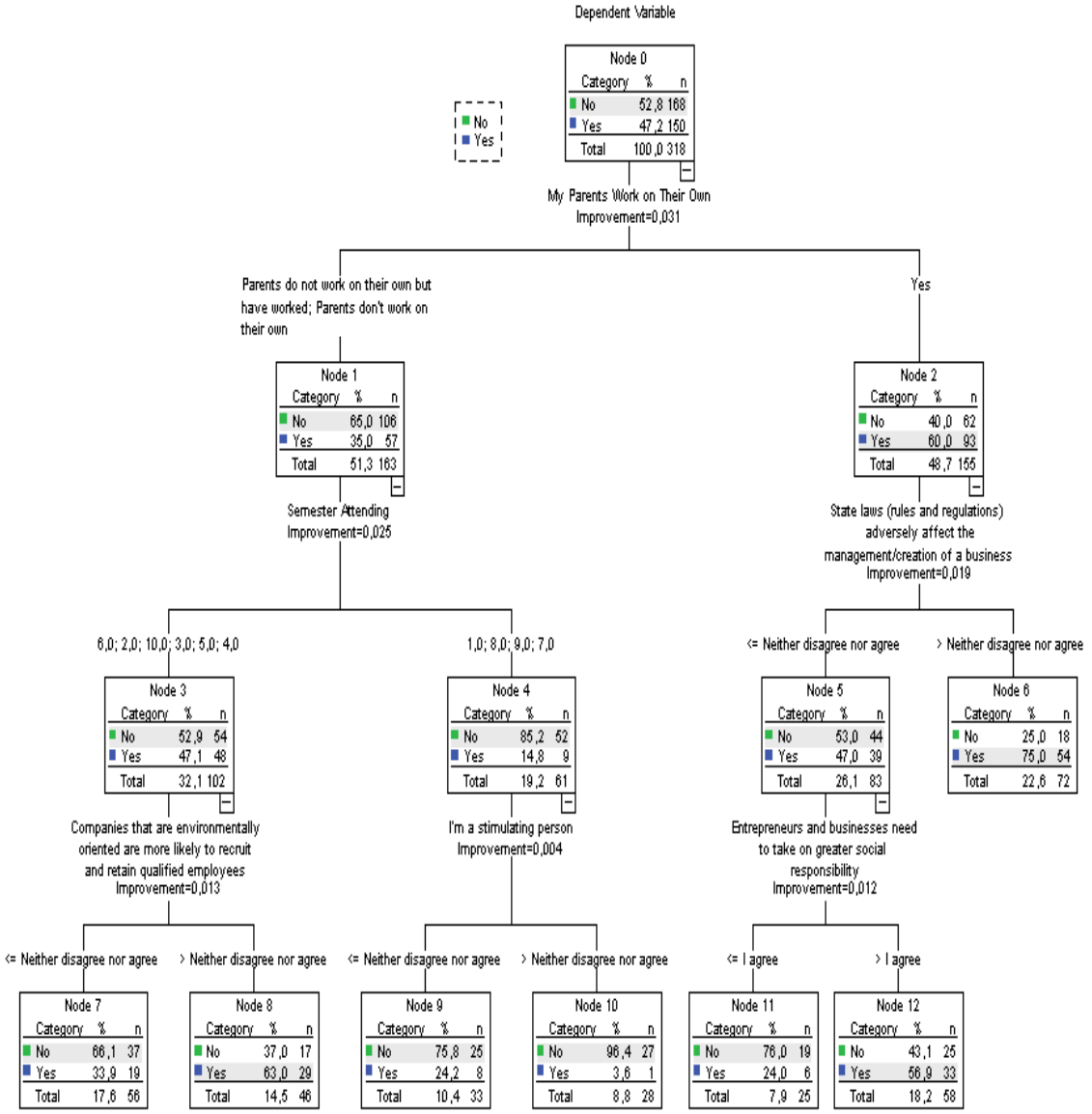

Figure 1 - Classification and regression tree – CART
Source: Elaborated on by the authors.

Also noteworthy is Table 11, which is similarly related to CART, and addresses several aspects evidenced in the tree, namely: the nodes, highlighting the comparison of entrepreneurial intention and its absence; the independent variables; the improvement values that each variable represents; and the division values.

Node	No		Yes		Total		Predicted Category	Parent Node	Primary Independent Variable		
	N	%	N	%	N	%			Variable	Improvement	Split Values
0	168	52.8%	150	47.2%	318	100.0%	No				
1	106	65.0%	57	35.0%	163	51.3%	No	0	My parents work on their own	0.031	No, but it has worked; No, it never worked
2	62	40.0%	93	60.0%	155	48.7%	Yes	0	My parents work on their own	0.031	Yes
3	54	52.9%	48	47.1%	102	32.1%	No	1	Semester attending	0.025	6.0; 2.0; 10.0; 3.0; 5.0; 4.0
4	52	85.2%	9	14.8%	61	19.2%	No	1	Semester attending	0.025	1.0; 8.0; 9.0; 7.0
5	44	53.0%	39	47.0%	83	26.1%	No	2	25 - Barriers to entrepreneurship	0.019	<= Neither disagree nor agree
6	18	25.0%	54	75.0%	72	22.6%	Yes	2	25 - Barriers to entrepreneurship	0.019	> Neither disagree nor agree
7	37	66.1%	19	33.9%	56	17.6%	No	3	6 - Environmental protection	0.013	<= Neither disagree nor agree
8	17	37.0%	29	63.0%	46	14.5%	Yes	3	6 - Environmental protection	0.013	> Neither disagree nor agree
9	25	75.8%	8	24.2%	33	10.4%	No	4	15 - Stimulus and originality	0.004	<= Neither disagree nor agree
10	27	96.4%	1	3.6%	28	8.8%	No	4	15 - Stimulus and originality	0.004	> Neither disagree nor agree
11	19	76.0%	6	24.0%	25	7.9%	No	5	10 - Advantage of sustainability	0.012	<= I agree
12	25	43.1%	33	56.9%	58	18.2%	Yes	5	10 - Advantage of sustainability	0.012	> I agree

Table 11 - CART
Source: Elaborated on by the authors.

Considering the first analysis of the classification tree, we note university students with entrepreneurial intention: students who have self-employed parents (entrepreneurs in the immediate family) (normalized importance of 74.1%); students who are indifferent regarding the barriers to entrepreneurship (standardized importance of 69.6%); and agree on the importance of environmental protection (standardized importance of 50.5%). This is the most obvious group with entrepreneurial intention.

The influence of sustainable orientation on the entrepreneurial intention of university students is observed, and this provides support to identify the positive influence of entrepreneurial intention on college students who realize the importance of entrepreneurs in having social responsibility. There is no strong evidence to support $\mathbf{H}_1$, but there is evidence to highlight that students with entrepreneurial intention have greater sustainable orientation focused on environmental protection, in accordance with Seelos, Ganly, and Mair (2006), Spence et al. (2008), Parrish (2008) and Kuckertz and Wagner (2010).

Considering another group in the classification tree node analysis, we can see students who do not have self-employed parents and those who previously had self-employed parents; (normalized importance of 74.1%) and who are not seen as a stimulating person (normalized importance 42.4%). This group has the least entrepreneurial intention. Given this approach, it is inferred that the more the student feels that they are a stimulating and original person –propensity to innovate construct – the greater their entrepreneurial intention is, thus sustaining the acceptance of $\mathbf{H}_2$.

Referring to another group observed in the classification tree, it is worth mentioning: students who do not have close entrepreneurial relatives and those who previously had self-employed immediate family (normalized importance of 74.1%) and that do not agree with the relevance of environmental protection (normalized importance of 43.5%); these, in turn, represent the group with no entrepreneurial intention. Therefore, the perception of environmental protection is evident to students who have entrepreneurial intent. Moreover, this analysis verifies the non-rejection of $\mathbf{H}_1$ and provides evidence for the acceptance of $\mathbf{H}_3$, as there is evidence to affirm that when students have close entrepreneurial relatives, their entrepreneurial intentions will be higher.

It is noteworthy that, using the aforementioned analyses, there is evidence for the non-acceptance or rejection of $\mathbf{H}_1$, but there is strong evidence to claim that students with entrepreneurial intent present sustainable orientation focused on environmental protection. Finally, there was evidence to support and accept hypotheses $\mathbf{H}_2$ and $\mathbf{H}_3$ (Table 12).

Hypothesis	Construct	Expected Hypothesis Value	Observed Hypothesis Value
$\mathbf{H}_1$	Sustainability orientation	Positive influence on entrepreneurial intention	Without influence
$\mathbf{H}_2$	Propensity to innovate	Positive influence on entrepreneurial intention	Positive influence
$\mathbf{H}_3$	Entrepreneurs in the immediate family	Positive influence on entrepreneurial intention	Positive influence

Table 12 - Hypothesis synthesis
Source: Elaborated on by the authors.

5 CONCLUSION

The main objective of this study was to analyze the influence of the behavioral constructs of sustainable entrepreneurship on the entrepreneurial intent of college students. As a methodological basis, we used the model proposed by Kuckertz and Wagner (2010) containing the most suitable adjustment indicators for this type of research, and it is possible to obtain results with vital conclusions for the areas of knowledge involving administration, psychology and entrepreneurship sustainable. Regarding $\mathbf{H}_1$ ("There is a positive influence between the sustainability orientation of university students and their entrepreneurial intention"), considering the construct's orientation to sustainability, it was noted that there are indications to highlight the entrepreneurial intentions of university students through aspects related to sustainable orientation, particularly for environmental protection, which is in accordance with Dimaggio (1988), Schaltegger (2002), Seelos, Ganly and Mair (2006), Cohen and Winn (2007), Dean and Mamulle (2007), Spence et al. (2008), Parrish (2008), Zahra et al. (2009), Kuckertz and Wagner (2010) and GEM (2012). Dyllick and Hockerts (2002) stressed the importance of environmental concerns on the economy, as it positively impacts society as a whole. However, in this research, there was no evidence to accept or reject $\mathbf{H}_1$.

In reference to the propensity to innovate construct, represented by the KAI index, the stimulus factor and originality were highlighted (significance coefficient of 0.030 in logistic regression). In CART, it was possible to highlight a group of students without entrepreneurial intention; those who do not have close entrepreneurial relatives and are not stimulating (normalized importance of 42.4%). The more stimulating and original the individual considers themselves to be, the greater their entrepreneurial intention. This analysis admits $\mathbf{H}_2$ ("There is a positive influence between the propensity to innovate and the entrepreneurial intent of college students") confirming the studies by Shumpeter (1934), Kirton (1976), Taylor (1989), Carland, Carland and Hoy (1992), Lüthje and Franke (2003), Teixeira and Davey (2010), Teixeira and Forte (2011) and Teixeira (2013).

$\mathbf{H}_3$ ("Having entrepreneurs in one's immediate family positively contributes to the entrepreneurial intent of college students") highlighted the entrepreneurs in one's immediate family construct. In the logistic regression analysis, "Parents who are not self-employed" (significance coefficient of 0.005) and (B of -0.877) and "Parents are not self-employed, but have been in the past" (significance coefficient of 0.004) and (B of -0.950) demonstrates that when university students do not have entrepreneurial parents, their entrepreneurial intentions will be lower. In Brazil, there is often the influence of close entrepreneurial relatives on the entrepreneurial intention of university students. On the other hand, when there is no such familiar environment of entrepreneurship, there is a tendency for college students not to develop this entrepreneurial intention.

In the CART method, we can highlight students who do not have close entrepreneurial relatives and those who previously had close entrepreneurial relatives (normalized importance of 74.1%), and that do not agree with the environmental protection factor (normalized importance of 43.5%). This group had lower entrepreneurial intentions when compared to other groups in the adopted model. These earlier discussions supported the acceptance of $\mathbf{H}_3$**,** which is in line with the findings of research by De Wit (1993), Van Praag (1997), Reynolds et al. (2001), Noorderhaven et al. (2003), Van Der Zwan, Thurik and Cricket (2010), Teixeira and Davey (2010), Teixeira and Forte (2011) and Teixeira (2013). Moreover, it is valid to state that the entrepreneurial intention of the individual increases as their parents are already entrepreneurs.

Through the analysis of the behavioral constructs of sustainable entrepreneurship in the entrepreneurial intention of university students, strong evidence was found to prove $\mathbf{H}_2$ and $\mathbf{H}_3$, while in $\mathbf{H}_1$ there was insufficient evidence to confirm it, but there is evidence of sustainable orientation in the entrepreneurial intention of university students, which is in consensus with the research of Seelos, Ganly, and Mair (2006), Spence et al. (2008), Parrish (2008) and Kuckertz and Wagner (2010). Given this, it was found that Brazil still does not invest sufficiently in sustainability, especially when it comes to its north and northeast regions, and the university analyses does not offer sustainability-oriented disciplines, so university students do not align this aspect with entrepreneurship.

However, this study presented a number of limitations that were not overcome, and it should be highlighted that the investigation was conducted in only one course and a single university in Brazil. Moreover, no in-depth interviews were performed to obtain more accurate results from university students. Furthermore, sustainability related to the environmental axis was only addressed through the sustainable orientation construct.

In future research, the investigation of the constructs of sustainable entrepreneurship in the entrepreneurial intention of university students should take place in other universities and other management-related courses, such as engineering and economics, for example. Moreover, an investigation through the interpretative paradigm is suggested, using qualitative methods to understand sustainable entrepreneurship aligned with entrepreneurial intention, as well as using

other behavioral constructs related to sustainability, such as concerns regarding waste, sustainable consumption, the consumption of water and energy and the mobilization of environmental importance, among others.

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Contribution	[Author 1]	[Author 2]	[Author 3]	[Author 4]
1. Definition of research problem	√	√	√	
2. Development of hypotheses or research questions (empirical studies)	√	√	√	
3. Development of theoretical propositions (theoretical work)	√	√	√	
4. Theoretical foundation / Literature review	√	√	√	√
5. Definition of methodological procedures	√		√	
6. Data collection	√			
7. Statistical analysis	√		√	√
8. Analysis and interpretation of data	√		√	√
9. Critical revision of the manuscript	√	√	√	√
10. Manuscript writing	√	√	√	
11. Other (please specify)	√	√	√	√