

# Influence of sustainability and innovation on the entrepreneurial intention of Brazilian and Portuguese university students

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## Abstract

This study analyzes the influence of sustainable and innovative behavior on the entrepreneurial intention of Brazilian and Portuguese university students. It seeks to develop a model based on behavioral theory planned for entrepreneurial intention, an adaptive-innovation theory for innovative behavior and sustainability. An exploratory survey was conducted with university students from the Federal University of Ceará (Brazil) and the University of Algarve (Portugal). For data analysis, multivariate analysis techniques such as factorial analysis, logistic regression and classification and regression trees (CART) were used. The results confirm: (i) there is a positive relation between the entrepreneurial intention of the university students and the existence of their own businesses; (ii) there is no positive relationship between the professional experience of university students and their entrepreneurial intention; (iii) there is a positive relationship between the innovative behavior of university students and their entrepreneurial intention; (iv) there is a positive relationship between the sustainable behavior of university students and their entrepreneurial intention. In general, the results contribute to overcome the gap in the empirical literature that aligns phenomena such as entrepreneurship, innovation and sustainability, giving this study an innovative character, which allows recommendations for future research.

**Keywords:** Sustainable behavior. Innovative behavior. Entrepreneurial intention.

## *Influência da sustentabilidade e da inovação na intenção empreendedora de universitários brasileiros e portugueses*

### Resumo

Este estudo consiste em analisar a influência do comportamento sustentável e inovador na intenção empreendedora dos estudantes universitários brasileiros e portugueses. Busca-se desenvolver um modelo embasado na teoria do comportamento planejado para a intenção empreendedora, na teoria da adaptação-inovação para o comportamento inovador e na dimensão sustentável. Esta pesquisa é desenvolvida mediante uma *survey* exploratória com universitários da Universidade Federal do Ceará (Brasil) e da Universidade do Algarve (Portugal). Para a análise dos dados, utilizam-se técnicas de análise multivariada, como a análise fatorial, a regressão logística e as árvores de classificação e regressão (CART). Os resultados confirmam: (i) há uma relação positiva entre a intenção empreendedora dos estudantes universitários e a existência de negócios próprios dos pais; (ii) não há uma relação positiva entre a experiência profissional dos estudantes universitários e sua intenção empreendedora; (iii) há uma relação positiva entre o comportamento inovador dos estudantes universitários e sua intenção empreendedora; e (iv) há uma relação positiva entre o comportamento sustentável dos estudantes universitários e sua intenção empreendedora. De modo geral, os resultados contribuem para suplantam a lacuna da literatura empírica que alinha fenômenos como o empreendedorismo, a inovação e a sustentabilidade, e isto confere um caráter inovador para este estudo, o que possibilita recomendações para pesquisas futuras.

**Palavras-chave:** Comportamento Sustentável. Comportamento Inovador. Intenção Empreendedora.

## *Influencia de la sostenibilidad y de la innovación en la intención emprendedora de estudiantes universitarios brasileños y portugueses*

### Resumen

Este estudio se propone analizar la influencia del comportamiento sostenible e innovador en la intención emprendedora de los estudiantes universitarios portugueses y brasileños. El objetivo es desarrollar un modelo fundamentado en la teoría del comportamiento planeado para la intención de emprender, en la teoría de la adaptación-innovación para el comportamiento innovador y la dimensión sostenible. Esta investigación se desarrolla a través de una encuesta exploratoria con estudiantes de la Universidad Federal de Ceará (Brasil) y la Universidad de Algarve (Portugal). Para el análisis de datos, utilizamos técnicas de análisis multivariante, tales como análisis factorial, regresión logística y árboles de clasificación y regresión (CART). Los resultados confirman: (i) existe una relación positiva entre la intención emprendedora de los estudiantes universitarios y la existencia de empresas propias de los padres; (ii) no existe una relación positiva entre la experiencia profesional de los estudiantes universitarios y su intención emprendedora; (iii) existe una relación positiva entre el comportamiento innovador de los estudiantes universitarios y su intención emprendedora; (iv) existe una relación positiva entre el comportamiento sostenible de los estudiantes universitarios y su intención emprendedora. En general, los resultados contribuyen a llenar la laguna en la literatura empírica que alinea fenómenos como la iniciativa empresarial, la innovación y la sostenibilidad, y esto le confiere un carácter innovador a este estudio, lo que possibilita recomendaciones para futuras investigaciones.

**Palabras clave:** Comportamiento sostenible. Comportamiento innovador. Intención emprendedora.

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## INTRODUCTION

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In recent decades, entrepreneurship has been considered preponderant for the economic development of a country (TEIXEIRA and DAVEY, 2010; HISRICH, PETERS and SHEPHERD, 2014). Entrepreneurship focused on sustainable development is based on the triple bottom line (ELKINGTON, 1997), which balances the economic, social and environmental spheres.

Entrepreneurial intention is directly linked to entrepreneurship, and can be considered an intrinsic individual process. It leads to the contextualization of Ajzen (1991) to whom an intention is prior to the actual behavior of entrepreneurship, that is, it anticipates a creation or expansion of a business. Liñán and Chen (2009), Thompson (2009), Teixeira and Davey (2010) and Fayolle and Gailly (2015) point out innumerable models that are based on entrepreneurial intention, which rely on predicting potential entrepreneurs.

Another phenomenon that is widely recurrent in research concerning entrepreneurship is innovation, since the entrepreneur can be considered an innovator, capable of proposing critical solutions to problem solving (KIRTON, 1976; SOOMRO and SHAH, 2015). Therefore, in order to understand innovative behavior, the theoretical perspective of Kirton (1976) – Theory of Adaptation-Innovation is used, because it has notoriety and relevance in research related to the behavior of the individual linked to innovation.

The environmental dimension also complements the entrepreneurship axis, based above all on aspects related to the protection of the environment, with the aim of incorporating sustainable practices in the creation of business creation (BOSZCZOWSKI and TEIXEIRA, 2012). Therefore, in order for some business to have a position favorable to the environment, the founders must be aware of the impact of their actions regarding the environment (GONÇALVES-DIAS, TEODÓSIO, CARVALHO et al., 2009; KUCKERTZ and WAGNER, 2010; DENTCHEV, BAUMGARTNER, DIELEMAN et al., 2016).

Considering the discussions that contextualize the topics in question, this study propose the following question: “What is the relation of sustainable and innovative behavior in the entrepreneurial intention of university students?”

The main objective of this research is to analyze the influence of sustainable and innovative behavior on the entrepreneurial intention of Brazilian and Portuguese university students. The specific objectives are: (i) to identify the relationships between the profile of university students and their entrepreneurial intention; (ii) to analyze sustainable behavior in the entrepreneurial intention of university students; (iii) to investigate innovative behavior in the entrepreneurial intention of university students; and (iv) to develop a model that predicts entrepreneurial intention based on the profile of university students and their sustainable and innovative behavior.

In general, the theoretical contribution of this study is based on the following questions, as proposed by Whetten (1989): “what”; “how”; “why”; “who, where and when”. With regard to “what”, this research seeks to analyze the influence of sustainable behavior – through ecological awareness – and innovative behavior – through the individual’s cognitive style (information processing) in the entrepreneurial intention of Brazilian and Portuguese university students.

As to “how”, the purpose is to identify if the university student has an entrepreneurial intention (LIÑÁN and CHEN, 2009; THOMPSON, 2009). In addition, we seek to analyze the influence of sustainable behavior – using the theoretical-methodological perspective of Straughan and Roberts (1999) and Gonçalves-Dias, Teodósio, Carvalho et al. (2009), as well as grounding the innovative behavior through the Adaptation-Innovation Theory (KIRTON, 1976; FOXALL and HACKETT, 1992) in the entrepreneurial intention of Brazilian and Portuguese university students. Although Portugal has influenced the formation of Brazilian culture, Hofstede (2011) highlighted that entrepreneurship profiles between Brazilian and Portuguese students are different, which justifies the interest of this research.

Regarding “why”, we highlight the large portals of scientific research, such as Spell and Scielo, especially noting the scarcity of studies that align innovation-entrepreneurship-sustainability. These individual phenomena are largely grounded in the empirical and conceptual literature; however, when it comes to the alignment of these phenomena, literature is scarce or almost non-existent.

In what represents the set “who, where and when”, the limitations in the propositions of explanations in scientific research, where the contextual factors are limited and when they can be understood as the extension of a certain theory stand out.

This research is carried out in a specific moment, in which the Brazilian and Portuguese university students of the courses related to the management, like the course Administration course are analyzed.

## THEORETICAL FOUNDATION

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### Entrepreneurial intention

Studies and discussions on entrepreneurial intention have been gaining visibility and relevance in the last two decades of the 20th century, in research such as the ones of Shapero and Sokol (1982) and Krueger (1993). In the 21st century, the studies of Carvalho and González (2006), Teixeira and Davey (2010), Autio, Kenney, Mustar et al. (2014), Fayolle and Gailly (2015), Saeed, Yousafzai, Yani-De-Soriano et al. (2015), Khuong and An (2016) and Ferreira, Loiola and Gondim (2017) are highlighted in the literature on entrepreneurial intention.

Researchers in the field of entrepreneurship studies recognized the value of entrepreneurial intention as a key part of understanding the process of creating a company. Thus, with the evolution of the literature on entrepreneurial intention, some theories were considered crucial to explain this phenomenon in different contexts, such as innovation (AUTIO, KENNEY, MUSTAR et al., 2014), university (ZHANG, DUYSTERS and CLOODT, 2014) and personality traits (ARSHAD and LI, 2016).

In reference to the behavioral aspects of entrepreneurship, starting with Ajzen and Fishbein's Theory of Action (1977), which stimulated the Theory of Entrepreneurial Intention of Shapero and Sokol (1982) and the Theory of Planned Behavior (TPB) of Ajzen (1991). These theories are characterized as being dominant theoretical models that explain the entrepreneurial intention in the light of behavioral psychology. For example, TPB is used to explain behaviors, such as entrepreneurs and environmental (STEINMETZ, KNAPPSTEIN, AJZEN et al., 2016).

The intention of the individual in favor of entrepreneurship is addressed in the literature due to its relationship with factors such as time, cooperation with others, [...] propensity to innovate, financial resources, skills, among others. It represents, in turn, the behavioral control made by the individual, directed to the entrepreneurial behavior (TEIXEIRA and DAVEY, 2010; KHUONG and AN, 2016).

In addition, Carvalho and González (2006) demonstrate external and individual factors that influence the behavioral attitude-intention, which are denoted in studies concerning the entrepreneurial intention; and Bergmann, Hundt and Sternberg (2016) highlight the contextual perspective, especially the university that can contribute to the formation of entrepreneurial intention.

### Theory of adaptation-innovation

The Theory of Adaptation-Innovation, proposed by Kirton (1976), shows that people are able to propose creative solutions to solve problems. In such a case, it exposes the involvement of the individual's behavior through, mainly, creativity and innovation.

The KAI theory seeks to reveal tools aimed at creativity as well as solve team problems in order to achieve positive results (STUM, 2009). In addition, a number of empirical studies have sought to highlight the influence of KAI on the identification of potential entrepreneurs, such as Kuckertz and Wagner (2010), Wurthmann (2014) and Soomro and Shah (2015).

Kirton (1976) considers styles innovative and adaptive, which influence behavior and prevail in problem solving and decision making. Cognitive styles are stable individual differences in the preference to obtain, organize, and use information for decision making.

Stum (2009) demonstrates the KAI as a cognitive style (information processing) that promotes organizational, personal and social changes. This author highlights the influence of globalization on organizations as they foster the individual's ability to cope quickly with the constant changes in society and the marketplace.

Kirton (1976) considers the [...] KAI index seeks to measure two styles of problem solving: adapter ("doing things better") and innovative ("doing things differently"). In general, the research proposed by KAI is to identify the individual's cognitive style (FOXALL and HACKETT, 1992).

## Sustainable behavior

For sustainable behavior, it is worth mentioning, firstly, the problems related to the environment, since they are becoming research concerns related to environmental themes, trying therefore, to explain causes that influence environmental degradation or environmental conservation, in addition to the impact of the sustainable behavior of individuals, through environmental awareness (GONÇALVES-DIAS, TEODÓSIO, CARVALHO et al., 2009; GRISKEVICIUS, CANTÚ and VUGT, 2012).

In this research, we present the sustainable behavior in the perspective of the individual's concern with environmental issues, which, consequently, are aligned with social issues (PATO and TAMAYO, 2006; GONÇALVES-DIAS, TEODÓSIO, CARVALHO et al., 2009; ARNOCKY, MILFONT and NICOL, 2014). Sustainable behavior refers to the development of alternatives that seek to reduce environmental degradation, with a focus on protecting the development through social and environmental solutions.

When aligning entrepreneurship with sustainable behavior, it is based on the fact that an individual, while engaging in entrepreneurial activities, can positively or negatively impact on the environment (KUCKERTZ and WAGNER, 2010), since when this individual has an environmental conscience, a positioning in favor or not in relation to the environment occurs (GONÇALVES-DIAS, TEODÓSIO, CARVALHO et al., 2009).

Considering the theoretical-methodological perspective of Gonçalves-Dias, Teodósio, Carvalho et al. (2009), this research seeks to identify the sustainable behavior, based on aspects of daily life, namely: water and energy consumption, energy reduction, use of resources in the residence and questions on the treatment given to trash.

## Hypotheses development

A set of items seek to measure traits such as: entrepreneurial intention (THOMPSON, 2009); environmental awareness issues: water and energy economy, waste treatment, mobilization and domestic environment (PATO and TAMAYO, 2006; GONÇALVES-DIAS, TEODÓSIO, CARVALHO et al., 2009); innovative behavior, through the individual's cognitive capacities – information processing (FOXALL and HACKETT, 1992; SOOMRO and SHAH, 2015); and sociodemographic variables (close family entrepreneurs, professional experience, gender, country of origin, among others) (CARVALHO and GONZÁLEZ, 2006; KUCKERTZ and WAGNER, 2010).

Previous studies (Fayolle and Gailly, 2015; Randerson, Bettinelli, Fayolle et al., 2015; Ferreira, Loiola and Gondim, 2017) found sufficient evidence to support the positive relation of the entrepreneurial intention of the individual who has parents with their own businesses. **H<sub>1a</sub>**: There is a positive relationship between the entrepreneurial intention of university students and the existence of own businesses of the parents.

In addition, regarding to the profile of Brazilian and Portuguese university students, it is sought to identify, in the context of culture, which country – Brazil or Portugal – presents a greater number of students with an entrepreneurial intention. This research corroborates that of Hofstede (2011), the this author emphasizes that the profile of Brazilian and Portuguese students is not similar, aspects such as aversion to uncertainly and distance from power are worth mentioning. Thus, another hypothesis emerges: **H<sub>1b</sub>**: There is a positive relationship between the country of origin of university students and their entrepreneurial intention.

Kuckertz and Wagner (2010) and Ferreira, Loiola and Gondim (2017) confirm that professional experience has an impact on entrepreneurial intention. Therefore, the following hypothesis arises: **H<sub>1c</sub>**: There is a positive relation between the professional experience of university students and their entrepreneurial intention. It also emphasizes the thought of Kuckertz and Wagner (2010), referring to the impact that a person, through the business creation, can generate in the environment. In this context, environmental protection occurs through the consciousness of the individual, since their actions can protect or degrade the environment (CORRAL-VERDUGO, 2012).

In relation to the issues to the field of sustainability action that concerns the daily life of the individual, it is mainly based on Gonçalves-Dias, Teodósio, Carvalho et al. (2009), since environmental awareness has a positive or negative effect on the individual's behavior (Box 1).

**Box 1**

**Dimensions of sustainable behavior**

Dimension	Description
Conscious Consumption	It groups variables related to respondents' attitudes to consumption. It expresses the level of awareness of individuals about the environmental issues that involve the posture of the manufacturers and also a more active character in the search for ecologically correct product options.
Concern with garbage	It brings together variables related to the attitude of the individuals regarding garbage and cleaning of domestic and public environments.
Boycott via Consumption	It entails behavioral variables related to consumption, yet the character of the individuals' posture indicates a greater propensity to penalize ecologically incorrect products and services.
Mobilization	Adds behavioral variables related to a proactive stance in the search of awareness of other individuals with regard to environmental issues.
Domestic Environment	It groups variables related to the individual's behavior in the home life. The variables are related to the daily use of natural resources, such as electricity and water.

Source: Adapted from Gonçalves-Dias, Teodósio, Carvalho et al. (2009).

From the perspective of the empirical literature on entrepreneurship and sustainable behavior, the following hypotheses emerge:  $H_{2a}$ : There is a positive relationship between the sustainable behavior of university students and their entrepreneurial intention; and  $H_{2b}$ : There is no significant relationship to sustainable behavior in the entrepreneurial intention between Brazilian and Portuguese university students.

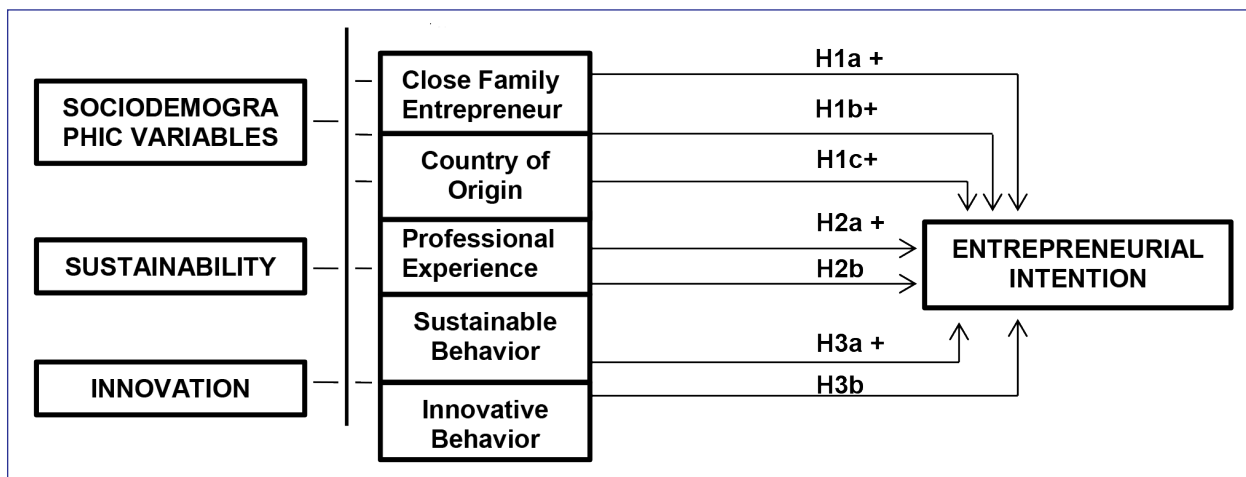
In reference to the innovative behavior, the theoretical-methodological basis of the Adaptation-Innovation Theory is used, which emphasizes the capacity of the individual to be innovative and able to propose creative solutions to problem solving (KIRTON, 1976).

Considering the entrepreneurial intention (THOMPSON, 2009; KUCKERZ and WAGNER, 2010) related to the innovative behavior – propensity to innovate – through the individual's cognitive styles (FOXALL and HACKETT, 1992; SOOMRO and SHAH, 2015), are considered the following hypotheses:  $H_{3a}$ : There is a positive relationship between the innovative behavior of university students and their entrepreneurial intention; and  $H_{3b}$ : There is no significant relationship regarding the innovative behavior in the entrepreneurial intention between Brazilian and Portuguese university students.

In view of these approaches, it is shown the hypothetical model of this research to be investigated among Brazilian and Portuguese university students (Figure 1).

**Figure 1**

**Hypothetical model of the research**



Source: Elaborated by the authors.

+ Positive relationship with entrepreneurial intention

There is no significant relationship with entrepreneurial intention

The proposed discussion sought to justify the adopted model and the pertinent concepts for the discussion of entrepreneurial intention, sustainable behavior, innovative behavior and sociodemographic variables to suggest the interconnection these variables, which allowed the development of a hypothetical model for this research. The methodological procedures that led to the development of this research are shown in the following section.

## METHODOLOGY

The classification proposed for this study is considered by Collis and Hussey (2005), to be a quantitative research of descriptive nature. In addition, it is explanatory to establish relationships between variables. The method used to obtain the data is an intentional survey (HAIR, BLACK, BABIN et al., 2009).

Specifically, the population was composed of university students from the Administration Courses of the cities of Fortaleza (Brazil) – Federal University of Ceará (FUC); and Faro (Portugal) – University of Algarve (UALg), both cities considered preponderant in local tourism, with expressiveness in local, regional and national entrepreneurship. The Administration course, in accordance with the evidence of Paço, Ferreira, Raposo et al. (2011), presents a wide incidence of studies and practices related to entrepreneurship, which supports the justification of the choice of this course for the chosen population.

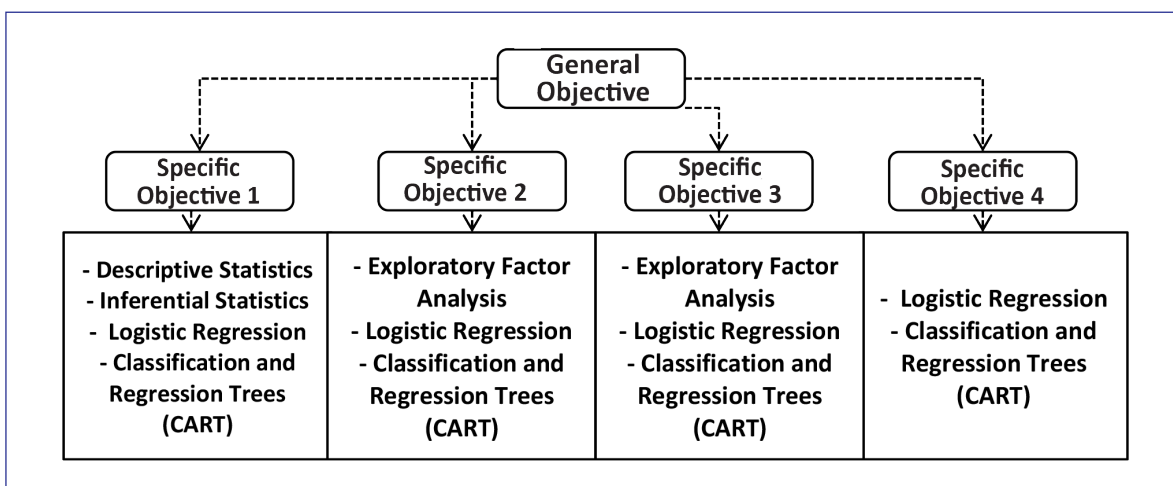
The data was collected between the months of August and December of 2016. The sample encompasses 400 university students, of these 285 students in the “Brazilian sample” in which there is predominance of university students with Entrepreneurial Intention (EI), in a total of 53.3%. As for the “Portuguese sample”, there is a quantitative of 115 individuals, of which 75.7% show EI. Men showed more IE than women in both samples.

The questionnaire, research instrument, was structured through a set of preestablished items, constituted, in the majority, in a likert scale of 5 points. With regard to entrepreneurial intention, the dichotomous analysis is used “yes/no” or if it is already entrepreneurial (LIÑÁN and CHEN, 2009); for sustainable behavior, ranges from 1 “never” to 5 “always” (GONÇALVES-DIAS, TEODÓSIO, CARVALHO et al., 2009); in relation to the innovative behavior, of 1 “totally disagree” to 5 “totally agree” (FOXALL and HACKETT, 1992); and close family entrepreneurs, country of origin and professional experience (LIÑÁN and CHEN, 2009; KUCKERTZ and WAGNER, 2010).

Figure 2 summarizes the statistical techniques used to achieve the objectives. For the analysis of the data the statistical software of statistical treatment of data is used: Statistical Package for the Social Sciences (SPSS) (version 22.0).

Figure 2

### Synthesis of techniques of statistical analysis of data



Source: Elaborated by the authors.

Exploratory Factor Analysis (EFA) was used to reduce the factors of sustainable and innovative behavioral aspects, with the Varimax orthogonal rotation type – rotation is used more when the number of variables is to be reduced. The criterion of the substitute variable is used for each factor of the construct, raising the variable used with greater factorial load, because it presents greater explanatory power in the construct (HAIR, BLACK, BABIN et al., 2009).

Logistic Regression (LR) and CART aim to develop a model that allows predicting entrepreneurial intention from the profile of university students and their sustainable and innovative behavior. These steps are fundamental for the development of the hypothetical model of the study, as well as to supplant the empirical literature of the entrepreneurial intention and the sustainable and innovative behavior, identifying a scientific model that makes it possible to highlight these behavioral and sociodemographic aspects in the entrepreneurial intention.

## ANALYSYS AND RESULT DISCUSSION

### Factor analysis for behavioral constructs

The factors of the Sustainable Behavior (SB), under the methodology of Gonçalves-Dias, Teodósio, Carvalho et al. (2009), are arranged in 16 items, grouped into five factors (Conscious consumption; Concern with garbage; Mobilization; Domestic environment; and Boycott via consumption).

The explanatory variance for this construct found from the division was 64.357%. The degree of explanation of the data was 0.826 – Kaiser-Meyer-Olkin (KMO = 0.826), a value higher than 0.5 indicates that the factor analysis is satisfactory.

**Table 1**

**Factor analysis of the sustainable behavior construct**

Variables	Factor loadings					Communalities
	Conscious consumption	Concern with garbage	Mobilization	Domestic environment	Boycott via consumption	
<b>SB1</b>	<b>.745</b>					<b>.597</b>
SB2	.743					.653
SB3	.540					.581
SB4	.740					.680
SB5	.696					.524
SB10	.521					.591
SB6		.850				.744
<b>SB7</b>		<b>.893</b>				<b>.823</b>
SB8		.787				.670
SB11			.673			.658
<b>SB12</b>			<b>.801</b>			<b>.657</b>
SB13			.634			.511
SB14				.527		.508
<b>SB15</b>				<b>.815</b>		<b>.679</b>
SB16				.765		.610
<b>SB9</b>					<b>.897</b>	<b>.812</b>

Source: Research data.

With the criterion of the substitute variable for each factor, it is clear to observe: Conscious consumption – SB1: “I have paid more for environmentally correct products” (factor load of 0.745); Concern with garbage – SB7: “I avoid throwing paper on the floor” (factor load of 0.893); Mobilization – SB12: “I mobilize people for the conservation of public spaces” (factor load of 0.801); Domestic environment – SB15: “I keep the refrigerator open for a long time, looking at what’s inside” (factor load of 0.815); and Boycott via consumption – SB9: “I buy products from a company even though it knows that it pollutes the environment” (factor load of 0.897).

In the analysis of the innovative behavior, there are some insignificant variables to the analysis, since they did not meet the minimum level suggested by the literature (communalities greater than 0.500). Therefore, a new factor analysis is performed, verifying an explanatory arrangement of 64.057% of the data variance. The Kaiser-Meyer-Olkin value (KMO = 0.700) and the Bartlett sphericity test (chi-square = 386.071) were shown to be significant (p = 0.000), and this indicates that there is a correlation between the variables, which results in a large amount of explanatory variance.

**Table 2**  
**Factor analysis of the construct innovative behavior**

Variables	Factor loadings				Communalities
	Preference to dynamism and creativity	Appropriateness to originality	Efficiency in details	Preference for change	
IB5	.700				.568
IB6	.733				.596
<b>IB7</b>	<b>.765</b>				<b>.614</b>
IB8	.360				.588
IB1		.767			.636
<b>IB3</b>		<b>.820</b>			<b>.688</b>
IB9			.804		.662
<b>IB11</b>			<b>.808</b>		<b>.669</b>
<b>IB13</b>				<b>.845</b>	<b>.743</b>

Source: Research data.

It is worth mentioning the variables with higher factor loads within each factor: Preference to dynamism and creativity – IB7: “I share my ideas” (factor load of 0.765); Appropriateness to originality – IB3: “I have new perspectives for old problems” (factor load of 0.820); Efficiency in details – IB11: “I prefer gradual rather than radical change” (factor load of 0.808); and Preference for change – IB13: “I need the stimulus of frequent change” (factor load of 0.845).

This construct points to three factors, taking into account the perspective of Foxall and Hackett (1992), which they call: appropriateness to originality, efficiency in details and preference for change (as opposed to compliance with rules). However, since the results of the analysis of the factor loadings for this construct, given the Brazilian and Portuguese samples, provided four factors, an additional factor will be defined, appointed in preference to dynamism and creativity.

In this sense, based on the factor structures of the EFA – which provided nine behavioral variables, the most representative within each factor, it is possible to portray, from a reliable point of view, the dimensions adopted for this research.

### Search model results

The proposed theoretical model for this research is verified using Logistic Regression for sustainable behavior, innovative behavior and sociodemographic variables – independent variables, in order to predict the Entrepreneurial Intention (EI) – dependent variable.



**Table 3**  
**Analysis of the logistic regression of the model variables**

Variables	B	Sig.	Exp(B)
Conscious consumption	-.032	.828	.968
Concern with garbage	-.236	.373	.790
<b>Mobilization</b>	<b>.293</b>	<b>.006</b>	<b>1.341</b>
Domestic environment	.233	.102	1.262
Boycott via consumption	.062	.685	1.064
Preference to dynamism and criativity	.050	.745	1,051
<b>Appropriateness to originality</b>	<b>.552</b>	<b>.001</b>	<b>1.736</b>
Efficiency in details	-.033	.785	.968
<b>Preference for change</b>	<b>.458</b>	<b>.001</b>	<b>1.581</b>
<b>Gender (female)</b>	<b>-.546</b>	<b>.037</b>	<b>.579</b>
Age	-.032	.355	.969
Married	-.101	.844	.903
Single	-1.820	.151	.162
Year you first enrolled in university	.005	.888	1.005
<b>Semester</b>	<b>-.116</b>	<b>.037</b>	<b>.891</b>
<b>University (UAlg)</b>	<b>.712</b>	<b>.035</b>	<b>2.038</b>
<b>Professional experience (owner/partner)</b>	<b>2.991</b>	<b>.007</b>	<b>19.897</b>
Profissional experience (private sector)	.332	.303	1.394
Profissional experience (public sector)	.278	.509	1.321
Profissional experience (another)	-.049	.917	.952
<b>Parent experience (no, but one of them used to be)</b>	<b>-.868</b>	<b>.011</b>	<b>.420</b>
<b>Parent experience (no, nether have ever been)</b>	<b>-1.164</b>	<b>.000</b>	<b>.312</b>
Constante	-10.814	.870	.000

Source: Research data.

For sustainable behavior, it is evident the mobilization – variable that refers to the mobilization that the individual provides to other people for conservation of public spaces, as well as to the importance of the environment. This relationship between the mobilization and the EI presents is significant (p-value of 0.006). The value of B for this relation was positive (0.293), and this indicates that the mobilization has a positive influence on EI. The other variables of sustainable behavior did not have statistically significant relationships in the model. Thus, it is confirmed  $H_{2a}$ : There is a positive relationship between the sustainable behavior of university students and their entrepreneurial intention.

Regarding the innovative behavior, are pointed out as representative variables, appropriateness to originality and preference for change, being possible to relate them as predictors to explain the EI of the university student. It is identifiable that appropriateness to originality exhibits p-value of 0.001 with B of 0.552 and preference for change, p-value of 0.001 with B of 0.458. The variable appropriateness to originality refers to the original ideas of individuals; and the variable preference for change means that the greater the preference for change, the less the individual wants norms and rules; both are positively related to EI.

$H_{3a}$  is therefore confirmed: There is a positive relationship between the innovative behavior of university students and their entrepreneurial intention. Therefore, the innovative behavior can be considered a predictor of the EI of the university students, it is emphasized that the greater the innovative behavior of the individual – turned towards originality and preference for change, the greater the possibility of the individual to have EI.

The variables related to the sample profile in the adopted model were also observed. Thus, the semester has a negative influence on the sample investigated, that is, the lower the semester, the higher the university student’s EI (p-value of 0.037 and B -0.116). Regarding the gender, a negative influence is perceived in women and their EI, and this allows to infer that the male gender has a positive relation with EI.

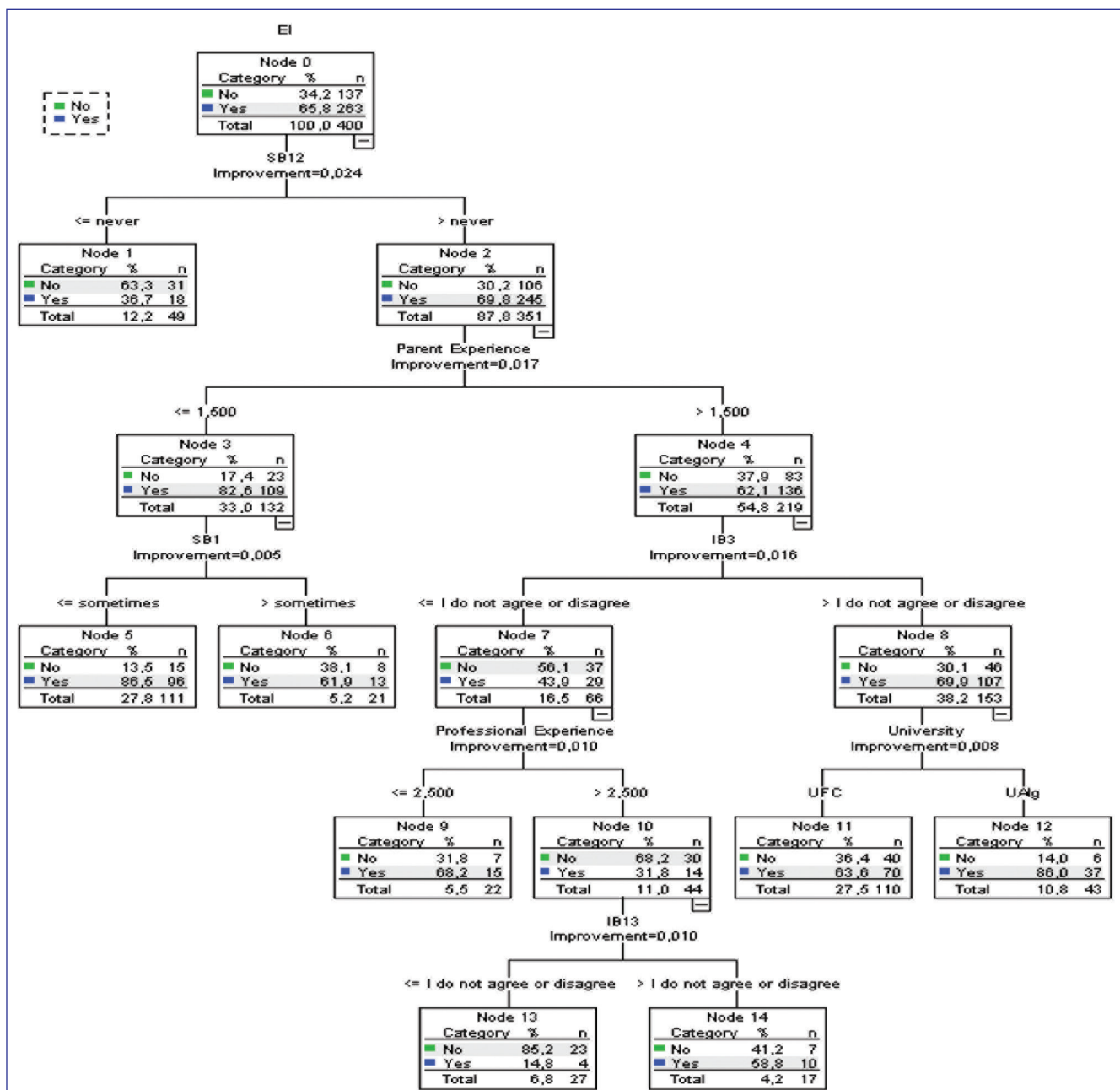
In addition, there is a positive relation for UAlg students, with  $Exp(B) = 2.038$ , which means that Portuguese students have double the chance to have entrepreneurial intention than the Brazilian students. This result allows us to confirm the hypothesis  $H_{1b}$ : There is a positive relationship between the country of origin of university students and their entrepreneurial intention.

Nevertheless, one can not infer the existence of the relation of professional experience with EI, and this is essential to reject  $H_{1c}$ : There is a positive relation between the professional experience of university students and their entrepreneurial intention.

In view of this model, it can be seen that the parent experience: at least one parent who was an entrepreneur, but no more (p-value of 0.011 with B of -0.868); and none of the parents was an entrepreneur (p-value of 0.000 with B of -1.164), these negative values of B provide evidence that the EI of university students is lower when the parents are not entrepreneurs. Therefore, it is understood that EI has a positive relation with close family of individuals, and this proves  $H_{1a}$ : There is a positive relationship between the entrepreneurial intention of university students and the existence of businesses of the parents.

The analysis of this logistic regression expresses Nagelkerke  $R^2$  of 0.324, that indicates that the adopted model is acceptable to explain the relation of the variables in the model. The value of the likelihood ratio (p of 0.000) asserts the viability of the applied model. In order to further deepen the developed model, another method is adopted: Classification and Regression Trees (CART).

Figure 3  
Classification and Regression Trees - CART



Source: Research data.

In addition, Table 4 identifies the CART method with the terminal node descriptions and their probability, considering university students who have entrepreneurial intention.

**Table 4**  
**Summary of the characteristics of terminal nodes**

Terminal Node	Descriptions of nodes	Probability (Has EI)
1	SB12 (Mobilization) <= Never	0.367
5	SB1 (Conscious consumption) <= Sometimes Parent Experience: At least one is an entrepreneur SB12 (Mobilization) > Never	0.865
6	SB1 (Conscious consumption) > Sometimes Parent Experience: At least one is an entrepreneur SB12 (Mobilization) > Never	0.619
9	Professional Experience: Owner of a business or has never worked IB3 (Appropriateness to originality) <= I do not agree or disagree Parent Experience: At least one has been an entrepreneur or none has ever been an entrepreneur SB12 (Mobilization) > Never	0.682
13	IB13 (Preference for change) <= I do not agree or disagree Professional Experience: Works in the public or private sector or other situation IB3 (Appropriateness to originality) <= I do not agree or disagree Parent Experience: At least one has been an entrepreneur or none has ever been an entrepreneur SB12 (Mobilization) > Never	0.148
14	IB13 (Preference for change) > I do not agree or disagree Professional Experience: Works in the public or private sector or other situation IB3 (Appropriateness to originality) <= I do not agree or disagree Parent Experience: At least one has been an entrepreneur or none has ever been an entrepreneur SB12 (Mobilization) > Never	0.588
11	FUC (Federal University of Ceará) IB3 (Appropriateness to originality) > I do not agree or disagree Parent Experience: At least one has been an entrepreneur or none has ever been an entrepreneur SB12 (Mobilization) > Never	0.636
12	UAlg (University of Algarve) IB3 (Appropriateness to originality) > I do not agree or disagree Parent Experience: At least one has been an entrepreneur or none has ever been an entrepreneur SB12 (Mobilization) > Never	0.860

Source: Research data.

The CART indicates the degree of importance of the independent variables as a function of the Entrepreneurial Intention (EI) – through subgroups (nodes). Considering the group of university students without EI, they do not have the habit of mobilizing other people in relation to the importance of the environment – variable mobilization (normalized importance 100%). However, this group manifests characteristics of low agreement for the boycott via consumption – that rarely or never buy products even though they know they pollute the environment (normalized importance 32.5%).

Based on the university students with EI, the group that shows strong influence refers to the characteristics such as mobilization; close family entrepreneurs (normalized importance 73.8%); with a neutral behavior for conscious consumption, which means that sometimes these individuals pay more for environmentally correct products. With this influence of the close family entrepreneurs in EI of the university students,  $H_{1a}$  is confirmed: There is a positive relationship between the entrepreneurial intention of university students and the existence of own businesses of the parents, and this is relevant to align this finding to the researches of Teixeira and Davey (2010), Sánchez (2011), Bae, Qian, Miao et al. (2014), Fayolle and Gailly (2015), Randerson, Bettinelli, Fayolle et al. (2015) and Ferreira, Loiola and Gondim (2017).

Concerning university students with EI, two more groups are considered with predominance for the following variables: mobilization, appropriateness to originality (normalized importance 67.8%) and Portuguese sample – UAlg (normalized importance 60.8%). The other group is evidenced by all these nodes, however, in the last node, we have the Brazilian sample – FUC.

From this perspective, it can be seen that mobilization (sustainable behavior) and appropriateness to originality (innovative behavior) can also be considered variables that predict EI of the university student. In this sense,  $H_{2a}$  is confirmed: There is a positive relationship between the sustainable behavior of university students and their entrepreneurial intention.

Therefore, it is assumed that university students with sustainable behaviors, in the face of practices, awareness and mobilization of the importance of environmental issues, may be the most likely to implement new business – focusing on sustainability and environmental protection (KUCKERTZ and WAGNER, 2010).

In addition to this hypothesis, the results obtained by the CART make it possible to corroborate  $H_{3a}$ : There is a positive relationship between the innovative behavior of university students and their entrepreneurial intention.

Based on this question, it is emphasized that the innovative behavior of the individual, aimed at creating new businesses, is relevant to accentuate creative and original solutions for the market. Thus, an individual with an innovative spirit can impact the economy as a whole by creating companies, since it provides jobs and income to society (KUCKERTZ and WAGNER, 2010; TEIXEIRA and DAVEY, 2010; SOOMRO and SHAH, 2015).

As these analyzes were recurrent and had influence in both samples (Brazilian and Portuguese), the hypothesis  $H_{2b}$  is also confirmed: There is no significant relationship to sustainable behavior in the entrepreneurial intention between Brazilian and Portuguese university students; and  $H_{3b}$ : There is no significant relationship regarding the innovative behavior in the entrepreneurial intention between Brazilian and Portuguese university students.

Regarding another group formed from the group of individuals without EI, it is pertinent to refer to appropriateness to originality, which was not very recurrent; professional experience, emphasizing above all, those already in the labor market; and little recurrent to the preference for change; these have been shown, in general, not to have EI.

On the other hand, it is emphasized that when the individual has professional experience and is already inserted in the labor market presents a lower EI level than individuals who have never worked. In this approach, we reject  $H_{1c}$ : There is a positive relationship between the professional experience of university students and their entrepreneurial intention, which contrasts Kuckertz and Wagner (2010), Bae, Qian, Miao et al. (2014) and Ferreira, Loiola and Gondim (2017). When verifying that both samples (Brazil and Portugal) presented significant relations to EI of the university student,  $H_{1b}$  is confirmed: There is a positive relationship between the country of origin of university students and their EI.

In relation to sustainable and innovative behavior, there is a positive relationship towards sustainable and innovative behavior in the entrepreneurial intention of Brazilian and Portuguese university students, and it should be noted that no significant relationship was found between the two samples, both of which presented a significant relation to the EI.

The results provided sufficient support for the confirmation of the hypotheses of this study, with the exception of  $H_{1c}$ , and this proposes a predictive model to predict the entrepreneurial intention from the profile of university students and their sustainable and innovative behavior. Thus, Box 2 indicates the expected and observed values in the hypotheses of this study.

**Box 2**

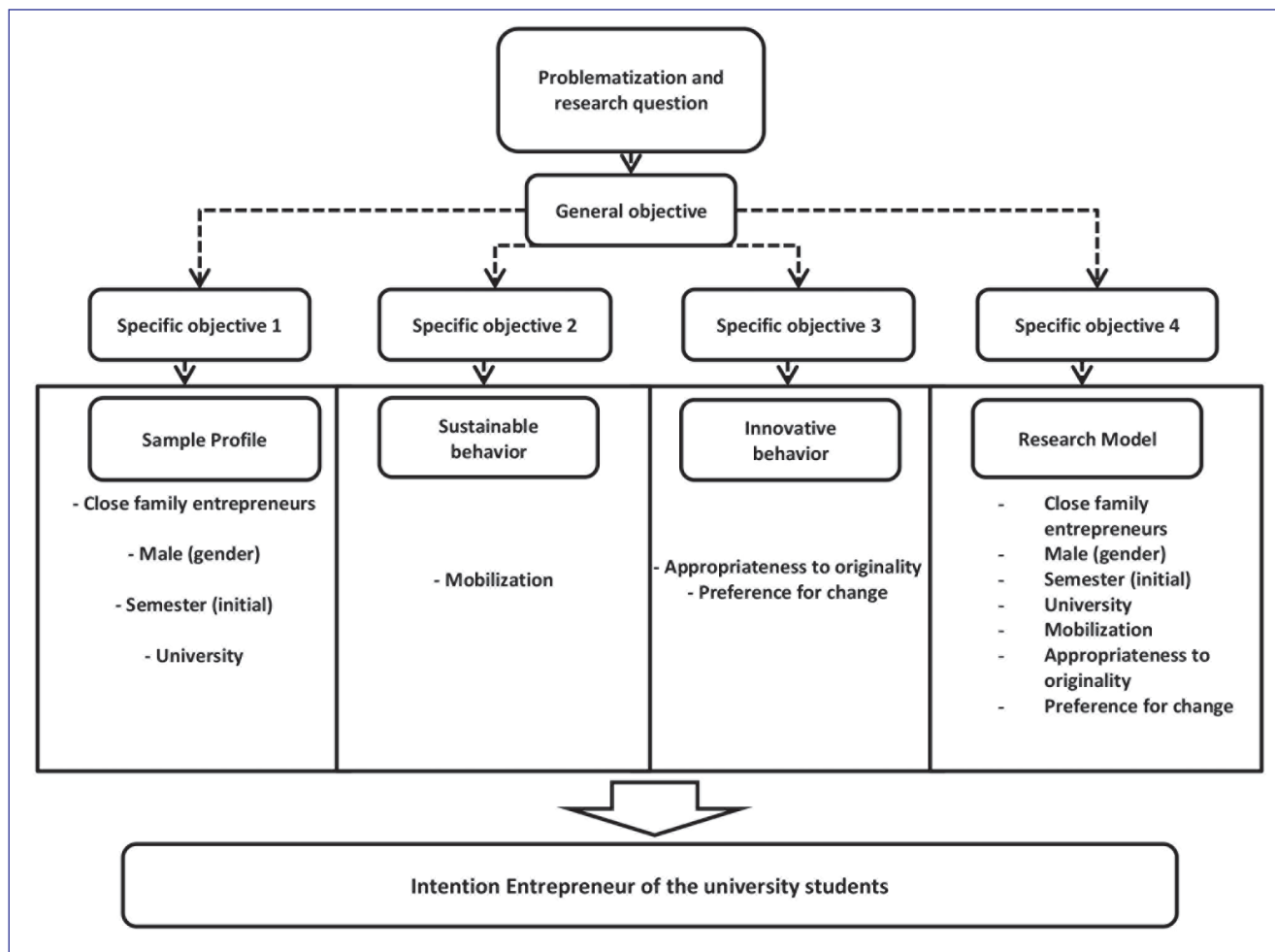
**Synthesis of hypotheses**

Hypothesis	Construct	Expected value of hypothesis	Observed value of hypothesis
$H_{1a}$	Close family entrepreneurs	Positive relationship in EI	Confirmed
$H_{1b}$	Country of origin	Positive relationship in EI	Confirmed
$H_{1c}$	Professional experience	Positive relationship in EI	Rejected
$H_{2a}$	Sustainable behavior	Positive relationship in EI	Confirmed
$H_{2b}$	Sustainable behavior between Brazilian and Portuguese university students	There is no significant relationship	Confirmed
$H_{3a}$	Innovative behavior	Positive relationship in EI	Confirmed
$H_{3b}$	Innovative behavior between Brazilian and Portuguese university students	There is no significant relationship	Confirmed

Source: Research data.

Figure 4 summarizes the main results obtained from the perspective of the model proposed for this study. This summary is therefore intended to indicate the fundamental factors that culminate in the prediction of the entrepreneurial intention of university students, based on the profile of university students and their sustainable and innovative behavior.

**Figure 4**  
**Summary of results in the proposed model**



Source: Research data.

According to the results, the variables that predict the EI are: mobilization; appropriateness to originality; preference for change; close family entrepreneurs; university; gender (men) and the first semesters of the university. This model sought to overcome the gap in the empirical literature, aligning aspects of intention and behavior (innovation-entrepreneurship-sustainability) from the Brazilian and Portuguese university students.

## CONCLUSION

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This study had as main guideline to analyze the influence of sustainable and innovative behavior on the entrepreneurial intention of Brazilian and Portuguese university students. From the specific objectives and the hypotheses, it was confirmed that the methodology was pertinent to meet the objectives of the proposed research.

For the specific objective 1 – “to identify the relations between the profile of university students and their entrepreneurial intention” – identified a strong influence of close family entrepreneurs in EI of the university students, that is relevant to stimulate and encourage entrepreneurship.

When highlighting the professional experience in EI of the university students, this variable did not have influence in the EI of the university student, and this was registered in the perspective that the university students without professional experience also revealed preponderance in having EI.

For the specific objective 2 – “to analyze the sustainable behavior in the entrepreneurial intention of the university students” – the influence of the sustainable behavior in the EI could be evidenced, emphasizing the mobilization dimension – that refers to the proactive position of the individual in the quest to encourage other people with regard to environmental conservation.

It should be noted that entrepreneurship, when aligned with the protection and conservation of the environment, based on environmental awareness, impacts the triple bottom line (economic, social and environmental spheres) (DEAN and MCMULLEN, 2007), which is relevant to verify that the sustainable behavior is fundamental in the EI of the university students. As this analysis was predominant for both FUC and UAlg university students, it was possible to emphasize that there were no significant relationships for sustainable behavior in EI between Brazilian and Portuguese university students.

In relation to the specific objective 3 – “to investigate innovative behavior in the entrepreneurial intention of university students” – it was detected that the dimension’s appropriateness to originality and preference for change were substantial to predict the innovative behavior in EI of university students. In this context, it could be verified that individuals with behaviors more focused on originality, sharing ideas, being stimulating for other people and liking to vary already established routines; and those who consider themselves to need the stimulus of frequent change, are those that have manifested higher EI.

This question is alluding to the perspective that an entrepreneurial individual is an innovator, capable of proposing innovative and original creative solutions to the market, and this corroborates with the ideas of Kirton (1976) and Soomro and Shah (2015). Therefore, considering the findings of this research, that the appropriateness to originality and preference for change represent the innovative behavior, these dimensions were considered predictors of EI. The results, appropriate to the innovative behavior, were predominant for both FUC and UAlg university students.

The specific objective 4 – “to develop a model that predicts entrepreneurial intention based on the profile of university students and their sustainable and innovative behavior” – highlighted the following variables that predict EI: Mobilization; Appropriateness to originality; Preference for change; Close family entrepreneurs; University; Gender (men) and the First semesters of the university.

From the point of view of the impact of this research in the short term, it is fundamentally perpetuated in the encouragement of policies and practices to university level institutions, with the purpose of boosting interest on environmental issues in university students, which, for the most part, are shown with EI. Because EI is essential for entrepreneurship, in a long-term perspective, this research provides enough support to impact entrepreneurship as a whole.

Although the literature on entrepreneurial intention is broad, both in the national and international databases, no studies were found that would allow the alignment of innovation and sustainability in the entrepreneurial intention of university students, which is fundamental to bring an innovative character to this research.

In future research, these phenomena could be examined in a longitudinal perspective, with different courses, in other universities and comparing them among other countries. The main focus for future scenarios is to further understand innovation and sustainability in the context of entrepreneurship.

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