

INTERNATIONAL STUDENT MOBILITY & UNIVERSITY-BASED ENTREPRENEURIAL ECOSYSTEMS

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Abstract:

This study aimed to understand Brazilian undergraduate students' perceptions of an entrepreneurial university ecosystem, considering the differences between students who did and who did not experience an exchange period abroad during their undergraduate course. The importance and effects of student mobility has been studied by several authors, and this study contributes to this corpus by analyzing the case of Brazil and also by connecting student mobility with U-BEE. We analyzed secondary data from a survey which was structured by Brazilian students' organizations in order to understand undergraduate students' perceptions on the university entrepreneurial ecosystem. The survey was sent to about 10.000 university students in Brazil, obtaining 2.876 valid cases. Twenty components of a U-BEE were extracted from the previous authors' study's and students were asked to grade them in terms of importance (1 = least important; 5 = most important). We then performed a Mann-Whitney U test to identify statistically significant differences in answers of exchange and non-exchange students. The results point out that students who experienced a period of study abroad value mostly the aspects related to the interaction and creation of synergies between the university and the external environment, especially the business sector, while students with no exchange experience value mostly the internal aspects, that is, what the university offers so that entrepreneurship is encouraged. More than international mobility initiatives, the incorporation in universities of these characteristics valued by exchange students and also non exchange students might bring more value to the Brazilian U-BEE and foster entrepreneurship.

Key-words: university-based entrepreneurial ecosystems; student mobility; internationalization; entrepreneurial universities.

INTRODUCTION

This paper aims to assess the connection between Brazilian undergraduate exposure to international higher education and their entrepreneurial tendencies and perspectives. The findings suggest that those with international experience held different perspectives on entrepreneurship in universities than their non-travelling counterparts, and therefore use of such programs may have an impact upon the structure of ST&I systems.

As global economies move ever closer to knowledge economies, public policy for Science, Technology and Innovation (ST&I) has become an important component of a nation-state's economic growth and development strategies. ST&I systems engage multiple actors (businesses, multinational firms, start-ups, universities, public research institutes etc.) working in competition with and/or in cooperation with under different political and economic contexts. Governments play a fundamental role in orienting this complex system, influencing framework conditions and creating innovation policies. In order to develop and engage in innovation activities, these actors need to have access to resources, such as scientific knowledge, skills and competencies, technology and innovation. In an increasingly globalized society, these resources are formed and shared on transnational and global platforms, rather than domestic ones (OECD, 2014).

Research activities are increasingly performed in collaborative networks between universities, companies and government representatives with some vision towards the application of new knowledge. This tendency might be explained by a variety of factors, including increased specialization in science, association between scientific fields (more trans- and multi-disciplinarity), the emergence of improved collaborative communication technology, the increased cost of scientific endeavor and subsequent need to pool resources. Internal institutional changes in universities alongside budgetary constraints, and heightened public demand for transparency and social benefits, as well as research funding policies help to stimulate and reinforce the need for collaboration across disciplines and across sectors (Bozeman & Boardman, 2013; OECD, 2014; Thune, 2009).

The cooperation between Universities and both private and public sectors has long been proposed as the best response to this new scenario in which the university finds itself, an instrument for improving the impact of research and as a catalyst of knowledge acquisition, learning and management of change. According to Vauterin, Linnanen & Michelsen's (2013), research on university-stakeholder partnerships can be divided into two core streams: 1) Triple Helix, the dynamic interaction between university, government and industry, shaping innovation systems and contributing to social and economic development (Etzkowitz & Leydesdorff, 2000); 2) Nature, structure, impact and underlying factors of collaborative, R&D-focused knowledge transfer partnerships between academia and industry.

As national economies become more interconnected, so tertiary education is also expanding its internationalization through a range of means, for example: distance learning, student exchange, international work experiences, international delivery of academic programs, off-campus delivery, dual validation of diplomas, diploma validation equivalency, postgraduate fellowships, scholarship provision, among others (OECD, 2015).

Internationalization of tertiary education benefits public research in several ways: 1) Inward mobility improves information flow, exposure to new ideas and perspectives, boosting the

country's ST&I system; 2) It is an opportunity for countries to attract and retain highly qualified individuals for the ST&I system and the national economy; 3) Increase in outward student and researcher mobility allows them to acquire experience and skills abroad, improving knowledge flow (OECD, 2014).

The student and researcher mobility intimately connected to the increased international cooperation in higher education and is also one important feature of public research internationalization. The attraction of scientific talent from abroad helps to boost domestic research and, vice versa, national students and researchers going abroad develop new knowledge, perspectives and professional / academic contacts (OECD, 2014).

Countries sending their students and researchers abroad for a period of studies incur the risk of losing some of their talented minds, an effect known as **brain drain**. Nevertheless, many emerging countries are sponsoring the student / researcher's time abroad, indicating that at least some students will return to their country of origin or create social and business connections between home and host countries, fostering **brain circulation** (Brasil, 2015; OECD, 2015).

The brain circulation approach suggests the potential benefits of temporary mobility, as this circulation helps to form connections between national ST&I systems, where these students/researchers (circulating brains) are considered mediators connecting the knowledge of their host countries to the regions from which they belong. Higher mobility in terms of brain circulation contributes to the career development of students and scientists, to the production and exchange of knowledge and to a potential increase in welfare (Saxenian, 2002; Edler, Fier & Grimpe, 2011).

The key motivation for circulation programs is the increasing perception that being connected to global networks and working together with students and scientists abroad improves capabilities and productivity of home students and scientists. These actors attain several individual benefits and also establish positive network effects between home and host countries, maintaining linkages, often for many years after initial contact (Defazio, Lockett & Wright, 2009; Edler, Fier & Grimpe, 2011).

Many countries recognize that international academic mobility and student exchange is a fundamental aspect in the processes of knowledge creation and exchange, intellectual capital creation and increased competitiveness. Mobility is important to connect social networks and these connections developed through face-to-face contact create trust relationships, enhancing social and economic inclusion (OECD, 2014).

In social network analysis, students and researchers in mobility programs abroad could be deemed weak ties, acting like bridges connecting different groups. According to Granovetter (1973), the strong ties concentrate relations within a specific group or organization, therefore, information flowing in strong ties concentrate in only a few groups. In contrast, weak ties move between different circles accessing a more diversified range of knowledge and information and act as a bridge favoring the information flow among different groups.

According to the OECD (2015), more than 4 million students (4,033,398) were enrolled in tertiary education outside their country of citizenship. Seven countries receive more than half of all international students: Australia, Canada, France, Germany, Japan, United Kingdom and United States. The countries with the greater number of citizens studying abroad are China

(729,338), India (192,206), Germany (120,570) and Korea (111,218), accounting for approximately 29% of all international students in tertiary education.

Brazil ranks 28 among the 211 countries of this study with 32.609 mobile students in 2013. The main countries of destination of the Brazilian students in 2013 are United States (10,401, 32%), Portugal (4,769, 15%), France (3,810, 12%), Germany (2,520, 8%), United Kingdom (1,573, 5%) and Spain (1,346, 4%) (OECD, 2015).

Regarding OECD countries, the study shows that the enrolment of international students tends to be higher in the more advanced levels of tertiary education; 24% of students enrolled in doctoral programs are international students. Regarding area of study, 36% of international students are enrolled social sciences, business and law, 14% in engineering, manufacturing and construction, 13% in health and welfare, 13% in humanities and arts, and 11% in science fields (Life and Physical sciences, Mathematics and Statistics, Computing) (OECD, 2015).

Mobility in the University Ecosystem

The university environment is being increasingly molded by external socio-economic and socio-demographic factors, and in this context universities are considered living and porous organisms in constant change. In order to enhance the capacity to adapt and respond to external conditions, contributing to the development of local and national economies, universities are encouraged to establish stronger and diverse collaborative relations with the business sector, government and society in general. The university activities which contribute to the economic and societal development of territories is usually called the third mission of universities, which complements and adds to the core activities of teaching and researching (Guerrero, Urbano & Fayolle, 2016; Loi & Guardo, 2015; Vauterin, Linnanen & Michelsen, 2013; Thune, 2009).

In third mission activities the connections between university and its stakeholders in a triple helix context are even more important, which brings up the concept of Entrepreneurial University. The Entrepreneurial University is considered to be the one engaged in third mission activities and embracing its role in the triple helix model. The Entrepreneurial University has many different definitions in the literature, among which we cite the following:

- Entrepreneurial University is the one “*which possess a wide range of new infrastructural support mechanisms for fostering entrepreneurship within the organisation as well as packaging entrepreneurship as a product*” (Jacob, Lundquist & Hellsmark, 2003, pp. 1556).
- “*A series of concentric circles, moving from broad engagement with society to a specific focus on enhancing economic development through research, educational, and entrepreneurial initiatives*” (Almeida et al., 2016, pp. 5).
- The university which “*provides an adequate environment for the university community that serves as a conduit for entrepreneurial initiatives that will contribute to long-term economic and social development through its multiple missions (e.g., teaching, research, and entrepreneurial activities)*” (Guerrero, Urbano & Fayolle, 2016, p. 106)”.
- “*The academic community embedded in a favorable ecosystem that develops society via innovative practices*” (Neves & Manços, 2016)

In this context, universities are encouraged to work on strategies to develop an effective cooperation with the private and public sectors, to promote the internationalization of education

and research, to create synergies with other universities and research institutes, and to stimulate the interdisciplinary organization of knowledge. More than producing technology transfer outcomes (patents, start-ups, spin-offs), the university contributes in providing leadership for the creation of entrepreneurial thinking, actions and institutions, the entrepreneurship capital (Audretsch, 2014).

As we could see before, the concept of entrepreneurial university is not unique and the appropriation of this concept in the university activities also vary depending on different factors, such as history and culture, local context, mindset, university mission and policies etc. Beyond the definition, we also have to look at the ecosystem where those activities will be performed, identifying what might support or hinder the development of an entrepreneurial university ethos.

A supportive environment might facilitate the development of this entrepreneurship ethos within the university, as the local environment, with its unique combination of history, cultures, and canons, exerts a greater or lesser influence on the entrepreneurial efforts. In the development of entrepreneurial networks institutions are a fundamental part, as their different dimensions (normative, cultural-cognitive, regulative) exerts a certain level of impact on entrepreneurial processes. These institutions might be more or less supportive in specific regions, leading to diverse rates and types of entrepreneurial activities, and also different regional development paths (Alvedalen & Boschma, 2017).

A way to create such supportive environment is by developing an entrepreneurial ecosystem. Isenberg (2010) defines this ecosystem as a set of complex combinations among individual components that, when integrated into a holistic system, stimulates economic prosperity. Isenberg's model builds on six main domains to build an efficient entrepreneurship ecosystem: Policy, Finance, Culture, Supports, Human Capital and Markets (Isenberg, 2011).

These ecosystems may occur at national, regional and community levels. Recently, universities are being considered not only as valuable entities in regional ecosystems, but also a potential entrepreneurial ecosystem itself, a University-based Entrepreneurial Ecosystem (U-BEE) (Fetters et al., 2010; Mikkonen, 2015). U-BEE is described by Fetters et al. (2010) as *“multidimensional enterprises that support entrepreneurship development through a variety of initiatives related to teaching, research and outreach (p. 2)”*.

In a U-BEE, some key aspects include: 1) Entrepreneurship course offerings; 2) Alumni entrepreneur's engagement; 3) Student business incubators and technology parks; 4) Development of innovative pedagogies and teaching materials; 5) Scholarly research on entrepreneurship; 6) Outreach initiatives; 7) Faculty leadership in entrepreneurship activities; 8) University's senior leadership in entrepreneurship activities; 9) Provision of the appropriate infrastructure; 10) Provision of the needed resources among others (Fetters et al., 2010).

U-BEE is important to support the entrepreneurial culture, values and attitudes, and in structuring and supporting relationships among stakeholders (public and private players). It also promotes the creation of a context (dynamic, comprehensive and resource-rich) which enables the deliver of entrepreneurship education and supports the development of start-up and new ventures (Mikkonen, 2015; Rice et al., 2010; Rideout & Gray, 2013).

For Bischoff, Volkmann & Audretsch (2017), U-BEE success and persistency depends on some key factors, such as: the existence of entrepreneurial leaders, pushing entrepreneurship forward in the university; long-term commitment of faculty and senior leadership and are considered as important for establishing a university-based entrepreneurial ecosystem; sustained collaboration with external stakeholders. Regarding this last topic, the most common external stakeholder groups collaborating with universities are: Entrepreneurs and Companies, Alumni, Other Universities, Science and Technology Parks, Incubators and Accelerators and Governmental Organizations.

Potocan et al. (2016) surveyed a sample of Croatian and Slovenian university students in order to evidence what academic activities they consider most important to develop their entrepreneurial abilities. Although students in both countries seem to have different priorities, the highly ranked items in both were: exchange programs at different academic institutions, cities or countries; practical involvement of lecturers in entrepreneurship; creation of incubators; networking with successful entrepreneurs and entrepreneurial companies.

Mobility programs in Brazil

The mobility of undergraduate students was very much incentivized in the last 5 years by the Brazilian Ministry of Science, Technology and Innovation (MCTI), responsible for coordinating, supervising and controlling all ST&I activities in Brazil. Mobility programs have been part of Brazilian ST&I strategies since 1978 with the CAPES-COFECUB program, a cooperation and mobility program between French and Brazilian institutions, until nowadays, with an increased number of cooperation and mobility programs with several countries. From 2012 to 2015, one of the mobility programs which stands off in terms of the number of benefited students and researchers is the Science without Borders (SwB).

The SwB program was established in 2011 by two Brazilian ministries, MCTI and Ministry of Education, in close alignment with the Brazilian National ST&I Strategy (ENCTI) 2012-2015, including priority areas concentrated in Science, Technology, Engineering and Math (STEM) fields. The main objectives of the program were to invest in training of highly qualified personnel and increase the presence of researchers and students at all levels in foreign institutions of excellence, based on the ENCTI 2012-2015 (Brasil, 2012) action lines which aim, equally, to expand and strengthen the formation of strategic human resources, focusing on basic sciences and engineering and the consequent increase in the insertion of Brazilian science in international R&D networks.

Until January 2016, the program has sent 91.601 students/researchers to 46 countries. The majority of students (73.353, 80%) are undergraduate students and the countries that received the majority (65%) of the students/researchers were United States (27.821), United Kingdom (10.740), Canada (7.311), France (7.279) and Australia (7.074). Among the priority areas, the most benefited ones were: engineering and other technological areas (41.594); biology, health and biomedical sciences (16.076); creative industries (8.061); hard sciences and earth sciences (7.361); computer science and information technology (5.694). From 2011 to 2015, the investments in the program were a total of R\$10.463,5 million (Brasil, 2015).

A report elaborated by the Brazilian Federal Senate committee on science, technology, innovation, communications and informatics, published in the end of 2015, analyzed the SwB program. According to the commission, the SwB program innovates in extending

internationalization to the undergraduate education, stimulating the circulation of new knowledge, and the adoption of new methodologies and educational practices. The program has also increased international visibility of Brazilian higher education and created a stronger basis to the insertion of Brazilian universities in international research cooperation programs.

Nevertheless, the commission points out that this investment needs to generate concrete returns to society, which also requires a balance between undergraduate and graduate scholarships. It is also necessary an increased effort in the young talents and visiting professors' modality, which incentives foreign students and researchers to come to Brazil. The report cites some recommendations for the program continuity: partnerships with companies to finance a larger proportion of scholarships; program continuous evaluation; creating favorable conditions for research in Brazil; prioritize graduate scholarships, also maintaining undergraduate scholarships.

METHODOLOGY

The main objective of this study is to understand the differences in perceptions of an entrepreneurial university ecosystem between students who experienced and who didn't experience an exchange period abroad during their undergraduate course. For this purpose, we analyzed secondary data from a survey which was structured by five Brazilian students' organizations, namely: Brasil Júnior, AIESEC, Rede CsF, Enactus and Brasa. This survey aimed to understand Brazilian undergraduate students' perceptions of an entrepreneurial university ecosystem and enabled the publication of the first Brazilian Entrepreneurial University index (Neves & Manços, 2016).

The survey was structured based on Isenberg's (2010, 2011) considerations of an entrepreneurial ecosystem and on Fetters et al. (2010) study on the characteristics of this entrepreneurial ecosystem at the university level. As a result, the organizers generated five great categories and 20 items that compose an entrepreneurial university ecosystem, described in Table 1 bellow.

Table 1. Survey items

Domain	Survey Items
Entrepreneurial culture	Entrepreneurial training Entrepreneurial attitude of student body Entrepreneurial attitude of faculty Appreciation and recognition of the entrepreneur
Outreach	Pro-entrepreneurship events Extension projects Internationalization Relationship with the alumni network
Innovation and Networks	University-business proximity University-business R&D partnership New business creation Research applied to solutions of social and market demands
Financial Capital	Public investment Private investment

	Endowment funds Branding
Infrastructure and Support	Support from the management leadership Students' organizations pro-entrepreneurship Infrastructure Technology parks and incubators

Source: adapted from Neves & Manços (2016).

The core basis of the survey were the 20 components of an entrepreneurial university ecosystem described in Table 1. Students were asked to grade the importance of these characteristics to an entrepreneurial university ecosystem using a 5-point scale (only the first and last points were labeled: 1 = little importance | 5 = great importance). Before this central questions, students were asked the following:

Table 2 – Survey questions

Question	Description	Options
1	Gender	1 = Female 2 = Male
2	University	96 options of Brazilian universities and 1 option "other"
3	Studied abroad during undergraduate course	1 = Yes 2 = No
4	Country of study abroad	256 options provided
5	Family income	1 = less than R\$788 2 = R\$788 – R\$1.042 3 = R\$1.043 – R\$1.928 4 = R\$1.929 – R\$3.418 5 = R\$3.419 – R\$6.561 6 = R\$6.562 – R\$14.484 7 = greater than R\$14.484
6	Describe what would be an entrepreneurial university in your opinion	Up to 500 characters
7	Select 5 elements that MOST contribute to an entrepreneurial university	The same items from Table 1
8	Select 5 elements that LEAST contribute to an entrepreneurial university	The same items from Table 1

Source: adapted from Neves & Manços (2016).

This survey was sent between July and August 2016 to approximately 10.000 undergraduate students in Brazil, mainly those students who participated in the organizations cited above and those who were part of their networks, and obtained 4.376 responses. To identify possible inconsistencies in the 5-point scale question, we used the 2 last questions in Table 2 (7 and 8) as a filter. The inconsistencies were identified as follows:

1. Most contribute & Low grade (1 & 2)
2. Least contribute & High grade (4 & 5)

We excluded these inconsistent responses and the number of respondents dropped to 4.283. Using the software IBM SPSS, we selected only the respondents which answered all survey questions, resulting in 2.876 valid cases.

RESULTS AND ANALYSIS

Socio-demographic

Q1: Gender		
	<i>Frequency</i>	<i>Percentage</i>
Female (1)	1.338	46,5
Male (2)	1.538	53,5
Total	2876	100

Q2: University		
	<i>Frequency</i>	<i>Percentage</i>
UFRN	146	5,08
UNB	137	4,76
USP	115	4,00
UFC	112	3,89
UFV	109	3,79
UEM	101	3,51
UNESP	85	2,96
UFSC	73	2,54
UNIFEI	72	2,50
UFJF	72	2,50
Other	1854	64,46
Total	2876	100

University Region		
	<i>Frequency</i>	<i>Percentage</i>
Southeast	1318	45,8
Northeast	724	25,2
South	450	15,6
Midwest	252	8,8
North	132	4,6
Total	2876	100

Q5: Family income		
	<i>Frequency</i>	<i>Percentage</i>
Less than R\$788	57	1,98
R\$788 – R\$1.042	190	6,61
R\$1.043 – R\$1.928	315	10,95
R\$1.929 – R\$3.418	520	18,08
R\$3.419 – R\$6.561	709	24,65
R\$6.562 – R\$14.484	647	22,50
Greater than R\$14.484	438	15,23
Total	2876	100

Q3: Study abroad		
	<i>Frequency</i>	<i>Percentage</i>
No (2)	2528	87,9
Yes (1)	348	12,1
Total	2876	100

Q4: Country of study abroad		
	<i>Frequency</i>	<i>Percentage</i>
USA	127	36,5
Canada	30	8,6
UK	30	8,6
Germany	25	7,2
Australia	24	6,9
France	24	6,9
Portugal	14	4,0
Italy	13	3,7
Spain	12	3,4
Ireland	9	2,6
Other	40	11,5
Total	348	100

As we could see from the tables above, the gender distribution of the respondents is equilibrated, with a little predominance of male (53,5%) over female (46,5%) students. Most

students come from Universities located in the Southeast and Northeast regions of Brazil, which together account for 71% of all respondents. Regarding the Family income, 62,38% of the respondents have a family income ranging from of R\$3.419 to more than \$14.484.

About 12% of the respondents (348) are studying or have studied abroad during their undergraduate course, and most of them studied/study in USA, Canada and UK, which account for 53,7% of respondents' declared countries of study. In the following tables we specifically analyze the exchange student / non-exchange students in relation to the other variables (gender, university region and family income).

<i>Exchange</i>				
<i>Gender</i>		<i>Yes</i>	<i>No</i>	<i>Total</i>
	<i>Male</i>	62,9%	52,2%	53,5%
	<i>Female</i>	37,1%	47,8%	46,5%
<i>Total</i>		100,0%	100,0%	100,0%

<i>Exchange</i>				
<i>University Region</i>		<i>Yes</i>	<i>No</i>	<i>Total</i>
	<i>Southeast</i>	50,6%	45,2%	45,8%
	<i>Northeast</i>	22,1%	25,6%	25,2%
	<i>South</i>	14,9%	15,7%	15,6%
	<i>Midwest</i>	9,5%	8,7%	8,8%
	<i>North</i>	2,9%	4,8%	4,6%
<i>Total</i>		100,0%	100,0%	100,0%

<i>Exchange</i>				
<i>Family income</i>		<i>Yes</i>	<i>No</i>	<i>Total</i>
	<i>Less than R\$788</i>	0,6%	2,2%	2,0%
	<i>R\$788 – R\$1.042</i>	6,3%	6,6%	6,6%
	<i>R\$1.043 – R\$1.928</i>	8,9%	11,2%	11,0%
	<i>R\$1.929 – R\$3.418</i>	15,8%	18,4%	18,1%
	<i>R\$3.419 – R\$6.561</i>	27,0%	24,3%	24,7%
	<i>R\$6.562 – R\$14.484</i>	23,6%	22,3%	22,5%
	<i>Greater than R\$14.484</i>	17,8%	14,9%	15,2%
<i>Total</i>		100,0%	100,0%	100,0%

From the tables presented above, we can see that, in this sample, students who experienced an exchange study period abroad are mostly Male (62,9%), from universities in the Southeast region of Brazil (50,6%) and with a family income ranging from R\$3.419 to R\$6.561 (27%).

In the table below, we present the 5-point scale question frequencies for each item in our U-BEE presented in Table 1.

Item / Grade	1		2		3		4		5	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
<i>Support from the management leadership</i>	8	0,3	62	2,2	387	13,5	837	29,1	1582	55,0
<i>Infrastructure</i>	27	0,9	129	4,5	552	19,2	828	28,8	1340	46,6
<i>Technology parks and incubators</i>	13	0,5	69	2,4	382	13,3	924	32,1	1488	51,7
<i>Students' organizations pro-entrepreneurship</i>	20	0,7	44	1,5	203	7,1	525	18,3	2084	72,5
<i>Research applied to solutions of social and market demands</i>	25	0,9	117	4,1	518	18,0	883	30,7	1333	46,3
<i>Internationalization</i>	49	1,7	178	6,2	674	23,4	806	28,0	1169	40,6
<i>University-business proximity</i>	32	1,1	83	2,9	435	15,1	831	28,9	1495	52,0
<i>University-business R&D partnership</i>	18	0,6	74	2,6	369	12,8	885	30,8	1530	53,2
<i>Entrepreneurial training</i>	52	1,8	172	6,0	574	20,0	835	29,0	1243	43,2
<i>New business creation</i>	41	1,4	122	4,2	479	16,7	898	31,2	1336	46,5
<i>Pro-entrepreneurship events</i>	28	1,0	178	6,2	690	24,0	917	31,9	1063	37,0
<i>Extension projects</i>	47	1,6	247	8,6	730	25,4	900	31,3	952	33,1
<i>Public investment</i>	156	5,4	354	12,3	848	29,5	715	24,9	803	27,9
<i>Private investment</i>	138	4,8	350	12,2	996	34,6	812	28,2	580	20,2
<i>Endowment funds</i>	102	3,5	382	13,3	963	33,5	830	28,9	599	20,8
<i>Entrepreneurial attitude of student body</i>	18	0,6	79	2,7	307	10,7	726	25,2	1746	60,7
<i>Entrepreneurial attitude of Faculty</i>	8	0,3	31	1,1	285	9,9	732	25,5	1820	63,3
<i>Appreciation and recognition of the entrepreneur</i>	23	0,8	118	4,1	518	18,0	969	33,7	1248	43,4
<i>Relationship with the alumni network</i>	43	1,5	198	6,9	668	23,2	1019	35,4	948	33,0

We arbitrarily assigned a label to the 5-point scale in which a **low grade** is composed of points 1 and 2 in the scale, a **medium grade** of point 3, and a **high grade** of points 4 and 5. By doing so, we have generated a new table in which it is possible to see more clearly which items / aspects the sampled students value most / less.

Item / Grade	Low		Medium		High	
	Freq.	%	Freq.	%	Freq.	%
Support from the management leadership	70	2,4	387	13,5	2419	84,1

Infrastructure	156	5,4	552	19,2	2168	75,4
Technology parks and incubators	82	2,9	382	13,3	2412	83,9
Students' organizations pro-entrepreneurship	64	2,2	203	7,1	2609	90,7
Research applied to solutions of social and market demands	142	4,9	518	18,0	2216	77,1
Internationalization	227	7,9	674	23,4	1975	68,7
University-business proximity	115	4,0	435	15,1	2326	80,9
University-business R&D partnership	92	3,2	369	12,8	2415	84,0
Entrepreneurial training	224	7,8	574	20,0	2078	72,3
New business creation	163	5,7	479	16,7	2234	77,7
Pro-entrepreneurship events	206	7,2	690	24,0	1980	68,8
Extension projects	294	10,2	730	25,4	1852	64,4
Public investment	510	17,7	848	29,5	1518	52,8
Private investment	488	17,0	996	34,6	1392	48,4
Endowment funds	484	16,8	963	33,5	1429	49,7
Entrepreneurial attitude of student body	97	3,4	307	10,7	2472	86,0
Entrepreneurial attitude of Faculty	39	1,4	285	9,9	2552	88,7
Valorization and recognition of the entrepreneur	141	4,9	518	18,0	2217	77,1
Relationship with the alumni network	241	8,4	668	23,2	1967	68,4

As we can see from the table above, the five main aspects students valued with a higher grade (4 and 5) were: 1) Students' organizations pro-entrepreneurship; 2) Entrepreneurial attitude of Faculty; 3) Entrepreneurial attitude of student body; 4) Support from the management leadership; 5) University-business R&D partnership.

If we analyze this table from the differences between exchange and non-exchange students, although the highly valued categories appear to be the same for both groups, it is possible to observe some differences in specific categories.

	Exchange Yes						Exchange No					
	Low		Medium		High		Low		Medium		High	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Support from the management leadership	13	3,7	54	15,5	281	80,7	57	2,3	333	13,2	2138	84,6
Infrastructure	28	8,0	76	21,8	244	70,1	128	5,1	476	18,8	1924	76,1
Technology parks and incubators	8	2,3	44	12,6	296	85,1	74	2,9	338	13,4	2116	83,7
Students' organizations pro-entrepreneurship	15	4,3	39	11,2	294	84,5	49	1,9	164	6,5	2315	91,6

Research applied to solutions of social and market demands	13	3,7	53	15,2	282	81,0	129	5,1	465	18,4	1934	76,5
Internationalization	13	3,7	88	25,3	247	71,0	214	8,5	586	23,2	1728	68,4
University-business proximity	14	4,0	45	12,9	289	83,0	101	4,0	390	15,4	2037	80,6
University-business R&D partnership	10	2,9	40	11,5	298	85,6	82	3,2	329	13,0	2117	83,7
Entrepreneurial training	31	8,9	90	25,9	227	65,2	193	7,6	484	19,1	1851	73,2
New business creation	15	4,3	68	19,5	265	76,1	148	5,9	411	16,3	1969	77,9
Pro entrepreneurship events	32	9,2	108	31,0	208	59,8	174	6,9	582	23,0	1772	70,1
Extension projects	48	13,8	106	30,5	194	55,7	246	9,7	624	24,7	1658	65,6
Public investment	72	20,7	128	36,8	148	42,5	438	17,3	720	28,5	1370	54,2
Private investment	47	13,5	117	33,6	184	52,9	441	17,4	879	34,8	1208	47,8
Endowment funds	44	12,6	115	33,0	189	54,3	440	17,4	848	33,5	1240	49,1
Entrepreneurial attitude of student body	9	2,6	38	10,9	301	86,5	88	3,5	269	10,6	2171	85,9
Entrepreneurial attitude of Faculty	2	,6	42	12,1	304	87,4	37	1,5	243	9,6	2248	88,9
Valorization and recognition of the entrepreneur	20	5,7	89	25,6	239	68,7	121	4,8	429	17,0	1978	78,2
Relationship with the alumni network	20	5,7	74	21,3	254	73,0	221	8,7	594	23,5	1713	67,8

As we could see in the above table, some variables present discrepancies between the two categories of students. The higher differences are in the items Public Investment, Extension Projects and Pro-Entrepreneurship events, where non-exchange students appear to value these categories higher than exchange students.

In order to identify if the differences (between exchange / non-exchange students) in the answers to the 5-point scale questions are statistically significant, we performed the non-parametric Mann-Whitney U test using IBM SPSS. This test seems more adequate than the equivalent parametric test, the two independent sample t-test, as the distribution is not normal and because we cannot assume that the differences between the 5 points of the scale are equal (Gravetter & Wallnau, 2015).

The hypothesis of our test are the following:

H₀: there is no difference in the responses of students who studied abroad and who did not study abroad (no tendency for the difference in scores to be systematically positive or negative).

H₁: there is a difference in the responses of students who studied abroad and who did not study abroad (the difference in scores tend to be systematically positive or negative).

The results of the Mann-Whitney U test performed using IBM SPSS are described in the tables bellow.

Ranks

	Exchange	N	Mean Rank	Sum of Ranks
Support from the management leadership	Yes	348	1340,63	466540,50
	No	2528	1451,97	3670585,50
	Total	2876		
Infrastructure	Yes	348	1317,41	458460,00
	No	2528	1455,17	3678666,00
	Total	2876		
Students' organizations pro-entrepreneurship	Yes	348	1179,87	410594,50
	No	2528	1474,10	3726531,50
	Total	2876		
Internationalization	Yes	348	1507,98	524775,50
	No	2528	1428,94	3612350,50
	Total	2876		
University-business R&D partnership	Yes	348	1501,38	522481,00
	No	2528	1429,84	3614645,00
	Total	2876		
Entrepreneurial training	Yes	348	1287,55	448066,50
	No	2528	1459,28	3689059,50
	Total	2876		
Pro-entrepreneurship events	Yes	348	1261,22	438903,00
	No	2528	1462,90	3698223,00
	Total	2876		
Extension projects	Yes	348	1254,98	436734,00
	No	2528	1463,76	3700392,00
	Total	2876		
Public investment	Yes	348	1292,17	449676,00
	No	2528	1458,64	3687450,00
	Total	2876		
Private investment	Yes	348	1525,77	530967,00
	No	2528	1426,49	3606159,00
	Total	2876		
Endowment funds	Yes	348	1529,30	532197,00
	No	2528	1426,00	3604929,00
	Total	2876		

Valorization and recognition of the entrepreneur	Yes	348	1296,78	451278,50
	No	2528	1458,01	3685847,50
	Total	2876		
Relationship with the alumni network	Yes	348	1550,28	539498,50
	No	2528	1423,11	3597627,50
	Total	2876		

Test Statistics

	U de Mann-Whitney	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
Support from the management leadership	405814,500	466540,500	-2,611	,009*
Infrastructure	397734,000	458460,000	-3,115	,002*
Students' organizations pro-entrepreneurship	349868,500	410594,500	-7,915	,000*
Internationalization	415694,500	3612350,500	-1,757	,079**
University-business R&D partnership	417989,000	3614645,000	-1,666	,096**
Entrepreneurial training	387340,500	448066,500	-3,841	,000*
Pro-entrepreneurship events	378177,000	438903,000	-4,470	,000*
Extension projects	376008,000	436734,000	-4,594	,000*
Public investment	388950,000	449676,000	-3,626	,000*
Private investment	409503,000	3606159,000	-2,173	,030*
Endowment funds	408273,000	3604929,000	-2,260	,024*
Valorization and recognition of the entrepreneur	390552,500	451278,500	-3,632	,000*
Relationship with the alumni network	400971,500	3597627,500	-2,813	,005*

a. Grouping variable: study abroad

* Significant at 0.05

** Significant at 0.10

As we can see from the tables above, we can reject H_0 for 13 variables (p -value < 0.05 or p -value < 0.10), meaning that for those variables there is a difference in the score attributed by students who studied abroad and who did not study abroad during undergraduate course.

Given the test results, we may now identify the aspects of an entrepreneurial university ecosystem for which the exchange and non-exchange students diverge in opinion regarding its importance. Using the **mean rank** we can identify for each variable which group ranked it with a greater number of lower / higher scores.

Analyzing the mean rank of the 13 variables that passed the Mann-Whitney test, we identified the aspects of an entrepreneurial university ecosystem that students who studied abroad and who did not study abroad value the most. The following table synthesizes the results:

Exchange	No-Exchange
Internationalization	Support from the management leadership
University-business R&D partnership	Infrastructure
Private investment	Students' organizations pro-entrepreneurship
Endowment funds	Entrepreneurial training
Relationship with the alumni network	Pro-entrepreneurship events
	Extension projects
	Public investment
	Appreciation and recognition of the entrepreneur

As we can see in the table above, students who experienced a period of study abroad value mostly the aspects related to the interaction and creation of synergies between the university and the external environment, especially the business sector. Therefore, this student is concerned with the possibility of partnering with companies, the investment or donations made by companies to the university benefiting the students and the university in general. On the other hand, students with no exchange experience value mostly the internal aspects, that is, what the university offers so that entrepreneurship is encouraged, and not mainly how other external entities can collaborate in the development of university entrepreneurship.

Internationalization did not stand out as the main variable which exchange students value the most, as the difference from the non-exchange students was only significant at 0.10 (p-value = 0.079). This brings up the fact that internationalization / international mobility alone may not be sufficient. Students with exchange experience actually bring up a more important characteristic of an entrepreneurial university, which is the relationship and partnership with the business sector, also allowing them to invest and make donations to the university. This view is probably an effect of the exposure to this kind of environment in the host universities. About 37% of the exchange students in this sample studied in the United States, where the presence of the business sector in the university is more common in research, education and also funding.

CONCLUSION

In this study we aimed to understand the different perceptions of the university entrepreneurial ecosystem in the view of undergraduate students who did and who did not experience a period of exchange during their courses. We analyzed secondary data from a survey that collected the opinions of 2.876 Brazilian students on what most and least contributes to an entrepreneurial university ecosystem.

As we could see from the results presented in the previous section the visions of exchange and no-exchange student differ. These differences might be explained in part by the exposure to a different university environment, which affects what a student considers more or less beneficial to entrepreneurship. Exchange students value more the connections with business and other actors in the external environment of universities (external orientation), while no-exchange students value more the opportunities more linked to the university, like infrastructure, public investment and events. The internationalization aspect, which would be reasonable to think that

exchange students would value most, did not have a major difference when comparing to no-exchange students.

For future developments on U-BEE, this topic needs to be better explored in understanding the student's experiences and also in converting these results in improved public policies for university internationalization and also for the development of U-BEE in Brazilian universities. More than international mobility initiatives, the incorporation in universities of these characteristics valued by exchange students and also non exchange students might bring more value to the Brazilian U-BEE and foster entrepreneurship.

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