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THE INTERMEDIARY ROLE OF JUNIOR ENTERPRISES IN UNIVERSITY-INDUSTRY INTERACTION: THE CASE OF SANTA CATARINA

O PAPEL INTERMEDIÁRIO DAS EMPRESAS JUNIORES NA INTERAÇÃO UNIVERSIDADE-EMPRESA: O CASO DE SANTA CATARINA

Ana Maria Simões Ribeiro, Mestre
https://orcid.org/0000-0001-5807-4510
anasimoesribeiro@gmail.com
Universidade Federal de Santa Catarina | Programa de Pós-Graduação em Administração
Florianópolis | Santa Catarina | Brasil

Rafaela Escobar Burger, Mestre
https://orcid.org/0000-0002-6636-788X
rafaelaescobarburger@gmail.com
Universidade Federal de Santa Catarina | Programa de Pós-Graduação em Administração
Florianópolis | Santa Catarina | Brasil

Silvio Antonio Ferraz Cario, Doutor
https://orcid.org/0000-0002-0601-5663
fecario@yahoo.com.br
Universidade Federal de Santa Catarina | Programa de Pós-Graduação em Administração
Florianópolis | Santa Catarina | Brasil

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ABSTRACT

This study aimed to investigate how junior enterprises (JE) act as agents of university-industry interaction in the state of Santa Catarina. To this end, a study was carried out with the *Federação Catarinense de Empresas Juniores* in two stages. First, interviews were conducted with individuals in charge of directing and managing the JE. From the data of the interviews, a questionnaire was applied with the Santa Catarina's JEs. As a main result, it was possible to identify two main forms of interaction between JEs and companies and also the main benefits for U-I. The need to stimulate the creation and development of the JEs is highlighted, since they have an important role as intermediaries of the U-I relationship. As a contribution, it is pointed out that the performance of an agent mediating the U-I relationship, although far from solving the structural problems of T&C in fragmented systems, can create a fertile environment in ideas and projects that contribute to alleviate the institutional deficiencies typical of developing countries development. In addition to bringing U-I closer, the JEs consolidate the learning process, improving the skills and abilities of future professionals. With relatively few resources, it is possible to create mechanisms that induce permanent interaction between researchers and entrepreneurs, in order to implement a culture of searching for new ways to combine old factors.

Keywords: University-Industry Interaction. Intermediary Agente. Junior Enterprise.

RESUMO

O presente trabalho teve como objetivo investigar de que forma as empresas juniores (EJ) atuam como agentes de interação universidade-empresa, no estado de Santa Catarina. Para tal, foi realizado um estudo junto à Federação Catarinense de Empresas Juniores em duas etapas. Primeiro foram conduzidas entrevistas com indivíduos com cargo de direção e gerência das EJ. A partir dos dados das entrevistas, foi aplicado um questionário com as EJs catarinenses. Como principal resultado foi possível identificar duas formas principais de interação das EJs com as empresas e também os principais benefícios para U-E. Se destaca a necessidade em estimular a criação e desenvolvimento das EJs visto que estas possuem um papel importante como intermediadores do relacionamento U-E. Como contribuição, aponta-se que a atuação de um agente mediador da relação U-E, embora longe de solucionar os problemas estruturais de C&T em sistemas fragmentados, pode criar um ambiente fértil em ideias e projetos que contribua para amenizar as deficiências institucionais típicas de países em desenvolvimento. As EJs, além de aproximar U-E, consolidam o processo aprendizagem, aprimorando as competências e habilidades dos futuros profissionais. Com relativamente poucos recursos, é possível criar mecanismos que induzam a interação permanente entre pesquisadores e empresários, a fim de implementar uma cultura de busca por novas formas de combinar antigos fatores.

Palavras-chave: Interação Universidade-Empresa. Agente Intermediário. Empresa Junior.

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1 INTRODUCTION

During the last 20 years, higher education institutions have been the epicenter of discussion and focus of attention by legislators, managers and society because, in addition to promoting teaching and learning, they also act as sources of entrepreneurship and innovation (GUERRERO *et al*., 2016). Niosi (2002) argues that due to their expressive contribution, universities started to incorporate as a "third mission" to participate more actively in the process of social and economic development.

The literature on this theme emphasizes the importance of interactions and institutional arrangements, placing the universities as actors that can contribute to economic development, in a context of a knowledge-based economy. Within the National Innovation System (NIS), universities can establish links with the productive structure that allow accelerating the transfer of knowledge and technology (MOWERY; SAMPAT, 2007).

In this sense, due to the important role of universities as a source of knowledge and innovation, many companies have shown interest in maintaining collaboration activities with educational institutions. This perspective of university-industry interaction is defended by many authors as one of the sustaining anchors of an innovation system (ETZKOWITZ; LEYDESDORFF, 2000; PARANHOS; PERIN, 2018)

This collaboration, called university-industry interaction (U-I) consists of the arrangement existing inter-institutional relationship between academia and the market, essential in promoting research and scientific development. Factors such as increased global competitiveness, speed of technological innovations and the need for alternatives in view of the scarcity of resources make the E-I interaction increasingly important for the strategies of organizations and nations (AZEVEDO, 2016).

Despite its importance, the literature also discusses the existence of numerous barriers to the promotion of this E-I alliances (LEMOS; CARIO; DE MELO, 2015; PARANHOS; PERIN, 2018). According to these authors, this is mainly due to the difference in culture and functioning of universities and market organizations. One way to mitigate these problems is the action of intermediary organizations that facilitate this interaction. As the central activity of the NIS is the learning process, understood as a social activity that involves the interaction between people (PEREIRA; DATHEIN, 2012); and, the university as an institution whose purpose is teaching and learning, the importance of promoting and creating mechanisms that can strengthen E-I relations. One of the organizations that can act in this sense are the Junior

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Companies (JE), which provide learning and experience for undergraduate students through relationships with companies in the market (BARBOSA *et al.*, 2015).

JEs are non-profit organizations that function as laboratories, offering consulting services and products primarily for micro and small entrepreneurs. Students, in addition to working on the projects, manage the entity itself, with the help and guidance of their university's professors. For Ziliotto and Berti (2012, p. 213) "JE provides the practical application of theoretical knowledge related to the training area that the student has within the university". In addition to the need to take a serious stance in relation to the problems presented by client companies, JE individuals are also encouraged to develop a sense of responsibility, negotiation skills and teamwork (BERVANGER; VISENTINI, 2016).

However, despite its relevance, the literature on JE remains scarce and underexplored. Bevanger and Visentini (2016), from bibliometric research concluded that there is a latent lack in scientific production regarding the discussion of the JE theme. According to their analysis, there is more publication in events than in journals, which indicates a limited scope regarding the dissemination of intellectual production on this topic (BEVANGER; VISENTINI, 2016).

For the purposes of this research, only one paper was found that directly relates the JE with the U-I interaction. The work, from 1999, mentions junior enterprises as agents of interaction, however, it presents deficiencies in the discussion about how this relationship occurs and what are its results (DA CUNHA, 1999). Furthermore, in the specialized literature on U-I interaction, the role of intermediary organizations, in general, is not considered. Although the mechanisms that facilitate the U-I are widely studied, theoretical and empirical evidence on the participation of intermediary organizations is few and limited (VILLANI; RASMUSSEN; GRIMALDI, 2017). Finally, it is important to emphasize that most studies on U-I interaction are focused on Europe and the USA, with few studies on the Brazilian reality (KRUSS; VISSER, 2017).

Despite the scarcity of literature, the Brazilian junior enterprise movement (JEM) is the largest in the world, with twice as many companies in Europe. This demonstrates that Brazil has very expressive results (BEVANGER; VISENTINI, 2016) and, therefore, interesting possibilities to promote U-I interaction, through Junior Enterprises. In an analysis by Brazilian states, the Santa Catarina federation of junior companies (FEJESC) is one of the

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five main representatives of the national movement. FEJESC alone has 50 JE members, with more than 600 students working (FEJESC, 2019).

Considering the scenario and the research gaps presented, this paper aims to investigate how junior enterprises act as agents of university-industry interaction in the state of Santa Catarina. In the next sections, the theoretical framework on University-Industry interaction will be presented, as well as the role of JEs as agents in this phenomenon. Then, the proposed methodology, the results obtained in the research and the conclusions of the study will be presented.

2 UNIVERSITY-COMPANY INTERACTION

University-Industry Interaction is a form of technological cooperation between universities and companies, with the aim of generating innovation (NOVELI; SEGATTO, 2012). The United States was the pioneer in promoting the U-I interaction, with the development of mechanisms in 1980 to establish intellectual property rights over the results of inventions financed by federal funds for higher education institutions (HEIs) (CLOSS; FERREIRA, 2012). The role of knowledge exchange and cooperation between public research and the business sector has received increasing attention in the analysis of innovation and technological change (SCHARTINGER *et al.*, 2002). There was a rapid increase in the transfer of commercial knowledge from universities to professionals and organizations at the end of the 20th century and beginning of the 21st century, becoming a widespread phenomenon (SIEGEL; WESTHEAD; WRIGHT, 2003).

Literature has pointed to the emergence of the third mission in HEIs, combined with changes in the structure, governance and strategies of nations (ETZKOWITZ; LEYDESDORFF, 2000; NIOSI, 2002; GUERRERO *et al.*, 2016; PARANHOS; PERIN, 2018). These institutions, which previously had functions related only to teaching and basic research, have now strengthened their mission as organizations that promote entrepreneurship and train entrepreneurs (KALAR; ANTONCIC, 2015).

In this same direction, Johnson and Lundvall (2005) propose the learning economy approach as appropriate to address the high pace of economic, social and technical change that sustains the formation and destruction of specialized knowledge, reinforcing that what really matters for the economic performance is the ability to learn. Learning as a process whose result is the accumulation of knowledge depends on prior skills and access to external

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sources of information. This process takes, therefore, different formats and causes different impacts on the type of accumulated knowledge. Considering this scenario, universities contribute with crucial elements to the entrepreneurial ecosystem. These institutions are responsible for training qualified human capital, supporting the entrepreneurial culture, through educational projects and programs and building and strengthening relationships between entrepreneurs, investors, business incubators and other actors (GUERRERO *et al.*, 2016; SAMPAT; MOWERY , 2004).

U-I interaction can take place in different ways and mechanisms, from the most formal means to informal contacts. Some of the forms found in the literature are: meetings and conferences; consultancy and research contract; creation of physical facilities; associated research; contracted research; R&D together; joint or cooperative venture; technology transfer; joint patent filing; exchange of staff; hiring new graduates; development of *spinoffs*, among others (LEMOS; CARIO; DE MELO, 2015; AZEVEDO, 2016; FISCHER *et al.*, 2018b). In traditional ways, companies play a passive role and receive knowledge flows from HEIs through services. In bidirectional interactions, where companies play a proactive role, there are more possibilities for mutual benefits between the parties (ARZA, 2010).

In the case of Brazil, the success of U-I relations only happens at "interaction points", in some successful cases that have achieved long-term results, based on systematized collaboration and partnership strategies (SUZIGAN; ALBUQUERQUE, 2008). In Brazil, as well as in Latin America, the greatest concentration of research and development is located in HEIs, related to the professional training of academics (AZEVEDO, 2016). All these factors and characteristics of the Brazilian's National Innovation System intensify the importance of actions such as the promotion of U-I interaction (FISCHER *et al.*, 2018b) for strengthening institutions and socioeconomic development.

In order to reduce the difficulties and distances between HEIs and companies, universities are seeking to promote relationships through agents, also called intermediary organizations (VILLANI; RASMUSSEN; GRIMALDI, 2017) or bridge institutions (LEMOS; CARIO; DE MELO, 2015). These organizations can bridge the gap between U-I actors by strengthening communication and encouraging collaboration and partnerships.

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3 JUNIOR COMPANY ASEU INTERACTION AGENT

A Junior Enterprises (JE) is a non-profit association, linked to an higher education institution, which offers consulting services and products for organizations internal and external to the educational institution, but mainly for micro and small companies (DA CUNHA, 1999; BERVANGER; VISENTINI, 2016). Companies are managed and their projects carried out by volunteer students from one or more undergraduate courses and the revenue from services is fully reinvested in training, training or for the maintenance of their fixed and administrative costs (SATO; SATOLO; QUEIROZ, 2015) . To provide these services, students receive guidance from specialized teachers and professionals, generating a high socio-educational impact (BRAYNER *et al.*, 2018). The JE provide students with an increased sense of responsibility, entrepreneurial spirit and technical and academic development, through direct contact with the market (VALADÃO; DE ALMEIDA; MEDEIROS, 2014).

The main objective of JE is to promote skills and abilities for undergraduate students, bringing them closer to the market (BARBOSA *et al.*, 2015) increasing their employability levels (BERVANGER; VISENTINI, 2016). Students can learn by performing two types of functions, the first is related to the development of products and the provision of services to contractors, covering the entire flow, from customer acquisition to post-sales. The JEs offer products and services related to the subject of the knowledge areas of the course or undergraduate courses to which they are linked (ALMEIDA; DANIEL; FIGUEIREDO, 2019). In addition, students also manage their own company, having to develop skills such as human resources, finance, quality and project management. The composition of JE's management is made up of the executive board, administrative council and regiments of their own.

The proximity of junior entrepreneurs to research, projects and qualified professors from universities enables JE to provide quality services, often related to sources of innovation and development of new technologies. Therefore, JEs meet the interests of: the university, by helping in the training of students and publicizing the name of the educational institution; from the products and services sector, as it enables the offer of quality products and services at a lower price for companies; and students, who develop personally and prepare for the job market (BERVANGER; VISENTINI, 2016). The authors add that due to these characteristics,

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the market has been paying more and more attention to JE, as providers of quality services, but also as a source of qualified labor and as a bridge to relate to educational institutions.

The world's first JE was founded in 1967 by students at *L'Ecole Supérieure des Sciences Economiques et Commerciales* (ESSEC), in Paris, France (SATO; SATOLO; QUEIROZ, 2015). From the 1980s onwards, the model created in France spread to Switzerland, Belgium, Spain, the United States of America and Brazil, and in 1990 is founded the *Junior Association for Development in Europe* (JADE), the European confederation of junior companies. The model arrived in Brazil in 1987, through the Director of the France-Brazil Chamber of Commerce, João Carlos Chaves, with Business Administration students from the Getúlio Vargas Foundation in São Paulo being the first interested parties. After the expansion of the model in Brazil, in 2003, the Brazilian Confederation of Junior Companies (Brasil Júnior) was founded to defend the rights, represent and promote Brazilian JE (BRASIL JÚNIOR, 2019).

Brazil is appointed, within the global junior enterprise movement (JEM), as the owner of the highest number of JE, and more than doubles the number of junior companies in Europe (BARBOSA *et al.*, 2015). There are currently around 900 junior enterprises, 110 universities and more than 22 thousand junior entrepreneurs in Brazilian territory (BRASIL JÚNIOR, 2019). The JE are organized into state federations, which are responsible for developing the MEJ in the states in which they operate. The Federations in turn make up Brasil Júnior (BJ), the Brazilian confederation of junior companies. There are a total of 22 states plus the Federal District, the 5 most representative territories are Minas Gerais, São Paulo, Federal District, Espírito Santo and Santa Catarina (BRASIL JÚNIOR, 2019).

4 METHODOLOGICAL PROCEDURES

As for the approach, the procedures were of a qualitative nature, of the exploratory type, adopting the case study with multiple units of analysis as a research strategy. The case study is particularly appropriate for circumstances where research and theory are in the formative stage (YIN, 2016). Data were collected in two stages, from semi-structured interviews, questionnaires and document analysis.

First, two semi-structured interviews were carried out, with the president of the largest JE in Santa Catarina (ESAG Jr.) and with one of the Executive Directors of FEJESC. A key approach to limiting bias when exploring new phenomena through cases is to interview

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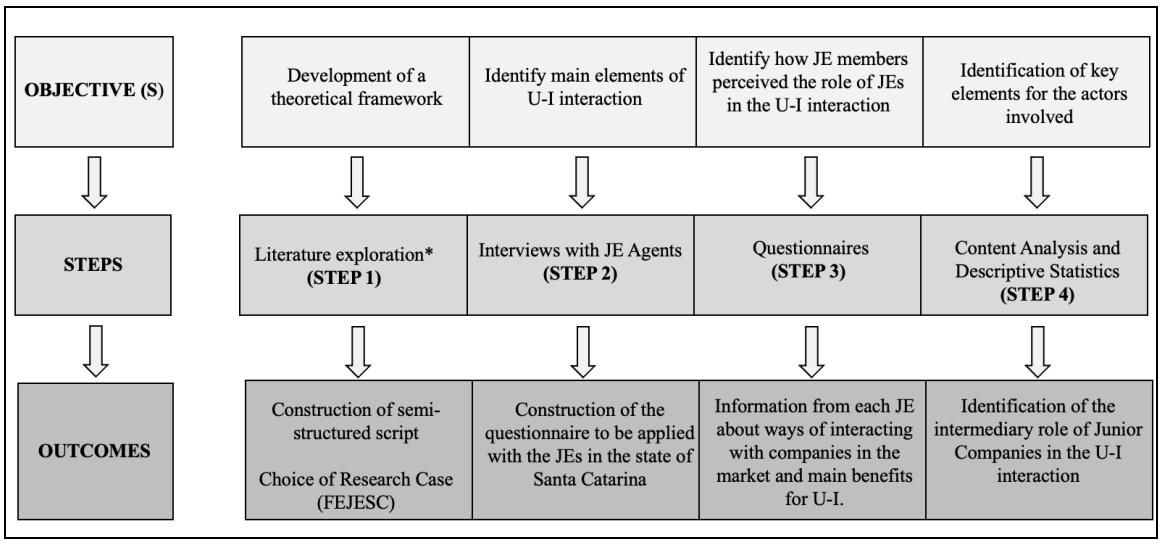
knowledgeable informants who see phenomena from a deep perspective (EISENHARDT; GRAEBNER, 2007). The script used and previously elaborated in the interviews was based on the research objectives and on the literature review. The analysis took place through content analysis (BARDIN, 2014). From the analysis of the interviews, two main categories of analysis emerged: (A) Main characteristics of the interaction; and (B) Benefits for the agents involved.

The two interviews carried out could serve as a basis for a larger-scale analysis with the JE in the state of Santa Catarina. In this sense, in the second stage of the research, based on the categories identified in the interviews, it was possible to develop a questionnaire whose objective was to identify how FEJESC affiliated JE members perceived the role of JE in the university-industry interaction and what benefits were generated for the parties involved. The instrument consisted of 15 questions, with two discursive (open) and thirteen objective (closed) questions. The questionnaires were prepared using the free Google® tool, Google Forms ® and were sent via e-mail to the presidents (or individuals with management functions) of the 50 JE associated with FEJESC. 37 completed questionnaires were obtained (TABLE 1). The open questions were analyzed again using content analysis (BARDIN, 2014). In the closed questions, descriptive statistics were used with calculation of means.

Figure 1 Research stages



Source: The authors.

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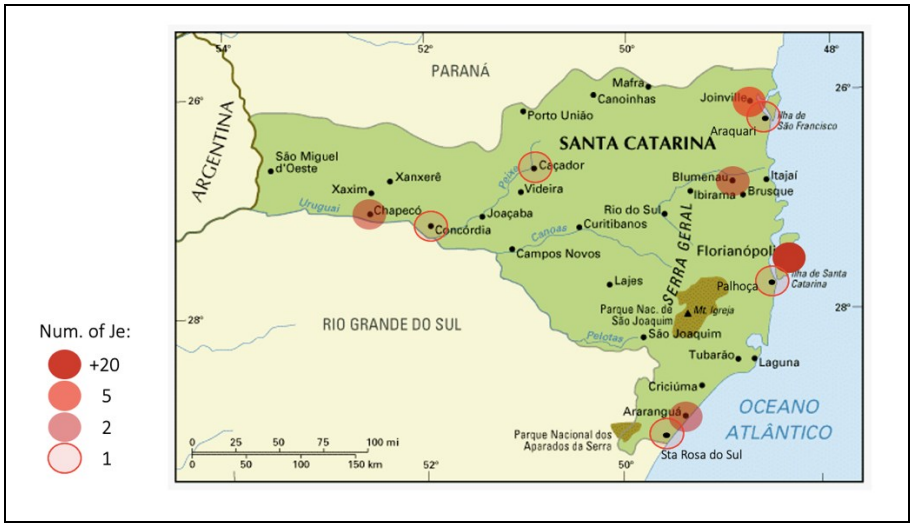
4 ANALYSIS AND DISCUSSION

Of the 50 companies with questionnaires sent out, 37 responded, representing a response rate of 72%. Regarding the characteristics of the respondent JEs, responses were obtained from 25 Presidents; 7 Executive Directors; 3 Vice Presidents; 1 Advisor; and 1 *Trainee* (see TABLE 1). The largest number of respondents is present in the coastal/eastern region, with 7 host cities of junior companies (see FIGURE 2). This fact can be explained by the fact that 3 of these 7 cities represent about 23% of the total population of Santa Catarina. In addition, in these cities are located the main campuses of the largest universities in the state, Universidade Federal de Santa Catarina, with 19 companies (51%) and Universidade do Estado de Santa Catarina with 5 companies (13%).

Regarding the area of knowledge, the field of engineering, with 16 companies (43%) represents the largest portion of JE, followed by the area of Health, Design, Law and Management, each with 3 companies (8% each). This fact seems to agree with Lundvall's (2007) interpretation when the author points out that U-I cooperation is more likely in certain sectors, such as those based on science and technology, such as chemical, pharmaceutical, mechanical, electrical and electronic. Some areas of knowledge are evidently more likely to develop innovation and applications in industry than others. There are academic environments in which the teaching and learning process itself is an incubator of ideas, developing technology through products and services. Junior companies arise from this need to apply theoretical/academic knowledge and the gradual and project-based insertion of students.

Figure 2 Respondent JE Map



Source: Survey data.

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Specifically in the state of Santa Catarina, FEJESC was founded in 1994, with the purpose of enhancing and accelerating the JEM of Santa Catarina, being managed by undergraduate students who work or have already worked in one of the state's JEs. It currently comprises 50 JE and more than 600 undergraduate students who work as junior entrepreneurs. The JE are present in 10 cities: Florianópolis, Balneário Camboriú, Blumenau, Joinville, Lages, Concordia, Chapecó, Laguna, Criciúma and Araranguá (FEJESC, 2019).

Based on the analysis of interviews and open questions in the questionnaires, it was possible to identify two main categories of analysis: Forms of interaction and Benefits for the University-Industry.

(A) Forms of interaction

Regarding the nature of the interactions, it could be observed that there are two main types of interaction between JE and companies. A relationship is essentially commercial, where companies outside the higher education institutions seek out the JE or are contacted by it, to hire their services or buy their products. The other type of interaction, partnerships, consists of relationships that go beyond buying and selling, where both parties seek to benefit in other ways.

For Dos Santos (2007), the commercial relationship differs from the partnership in 2 main points:

> (1) Business partners are mutually vulnerable and share risk taking. In the business relationship, suppliers often work to fulfill an agreement;
>
> (2) In the partnership, as there is joint production, there are factors that are not specified in the contract as there is (usually) the development of something new. While in commercial interaction, those involved interact based on a well-specified contract or agreement.

What differentiates the commercial interaction from the partnership, is that in outsourcing, the services provided (purchased) are intended for activities that do not belong to the company's ultimate objective and that sought outsourcing as a way to increase production and reduce costs (FERREIRA; SALERNO; LOURENÇÃO, 2011). For these authors, the partnership creates a technology common to those involved, as there will be a relationship based on mutual collaboration, exchange of information, parallel training, supervision and guidance from the one with the greatest technological development.

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Table 1 Characterization of respondents

Steps	Respondent Role	JE Headquarters City	Knowledge area
Step 1 (Interview)	President ESAG Jr.	Florianópolis	-
	Exec. Director FEJESC	Florianópolis	-
Step 2 (Questionnaire)	President	Araquari	Veterinary
	Director	Araranguá	Engineering
	President	Araranguá	Design
	President	Blumenau	Law
	Director	Blumenau	Law
	President	Caçador	Engineering
	President	Chapecó	Management
	Director	Chapecó	Engineering
	Vice-president	Concórdia	Veterinary
	President	Florianópolis	Management
	President	Florianópolis	Management
	President	Florianópolis	Agribusiness
	President	Florianópolis	Biology
	Project Advisor	Florianópolis	Design
	Vice-president	Florianópolis	Design
	President	Florianópolis	Law
	President	Florianópolis	Engineering
	Market Director	Florianópolis	Engineering
	GI Director	Florianópolis	Engineering
Step 2 (Questionnaire)	President	Florianópolis	Engineering
	Director	Florianópolis	Engineering
	President	Florianópolis	Engineering
	President	Florianópolis	Engineering
	President	Florianópolis	Engineering
	Director	Florianópolis	Health area
	President	Florianópolis	Health area
	Director	Florianópolis	Communication
	President	Florianópolis	Health area
	President	Florianópolis	Chemistry
	Trainee	Florianópolis	Information Technology
	Vice-President	Joinville	Engineering
	President	Joinville	Engineering
	President	Joinville	Engineering
	President	Joinville	Engineering
	President	Joinville	Engineering
	President	Palhoça	Pedagogy
	President	Santa Rosa do Sul	Agribusiness

Source: Survey data.

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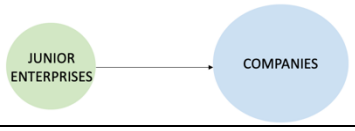
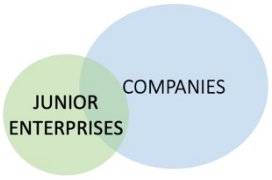
Table 2 Types of interaction

TYPE OF INTERACTION	CONCEPT	MECHANISM
Commercial	Sale of products and services	
Partnership	Collaborative activities between those involved	

Source: Prepared by the authors based on Ferreira, Salerno and Lourenção (2011).

-COMMERCIAL INTERACTION

When it comes to commercial interaction between junior companies and companies in the market, commercial interaction consists of the sale of products and services. In this sense, one of the indicators that represent the format of commercial interaction are the billing and the number of projects with the transfer of financial resources from the market company to JE. Table 2 represents JEs with annual sales above R$50,000.00.

Table 2 Trade interaction indicators

JE	HEI	Revenues	Nº of projects
Esag Jr.	UDESC	R$ 547.340,00	166
EJEP	UFSC	R$ 221.690,00	38
EPEC	UFSC	R$ 198.540,00	48
Ação Júnior	UFSC	R$ 197.920,00	57
i9	UFSC	R$ 146.590,00	59
Locus Iuris	UFSC	R$ 132.700,00	182
CONAQ	UFSC	R$ 100.420,00	19
Inventório	UDESC	R$ 94.470,00	74
Smart	UDESC	R$ 69.820,00	22
C2E	UFSC	R$ 52.570,00	21

Source: FEJESC.

These data demonstrate that many companies interact with the JEs in the state of Santa Catarina, generating significant financial value, which is fully reinvested in the students themselves and in the HEIs itself, as junior enterprises are non-profit organizations. Considering the high turnover of JEs, which mostly consist of junior companies from public universities (Table 2), it is noteworthy that commercial interaction is a means of improvement and investment in the teaching of the public network.

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It appears that more than 2 million reais were accounted for in revenue in 2019. Among the JEs, Esag Jr., a junior company of the UDESC for business administration, public administration and economics courses, stands out, with revenue of R$ 547,340.00 in 2019. In total, 1108 products and projects were contracted by companies, interacting with the JEs and the HEIs to meet their needs. This commercial interaction is responsible for generating direct financial return for the JEs, who use the money exclusively to develop the physical structure, processes and empower their members.

-PARTNERSHIP INTERACTION

Unlike commercial interaction, interactions through partnerships are cooperative in nature. There is involvement and interaction between those involved, capable of going beyond the limits of the simple formalization of a contract that defines price, quantity, and delivery time. Trust is an indispensable condition, as resources are released and confidential information exchanged FERREIRA; SALERNO; LOURENÇÃO, 2011).

Table 3 Forms of partnership interaction

Actions	Frequency	Percentage
Lectures at your educational institution, for all students	21	57%
Lectures, for your JE members	15	41%
Training/Courses, for JE members only	15	41%
Guided tours of one of these companies for JE members	13	35%
Supplier companies for JE	10	27%
Training/Courses, open to all college students	9	24%
Guided visits in one of these companies, for all students	3	8%
Financial investment made by companies in JE	3	8%
Patent registration in co-guardianship with a company	0	0%
Others	7	19%

Source: Research data.

According to Table 3, it is possible to identify numerous and frequent actions regarding the partnership between junior companies and companies in the market. It stands out for the activities of lectures and training which, according to Rocha and Freitas (2014), is a widely used and adequate practice for the development of individuals. This occurs, since the transfer of knowledge from the life experiences of entrepreneurs, inserting successes and failures that occurred during their trajectory reveals itself as a rich tool to encourage students (ROCHA; FREITAS, 2014; SILVA; PENA, 2017).

It is also noteworthy that, despite the frequency of interactions, companies in the market do not consider the development of patents together with the JE as a form of

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partnership. This fact can be indicative of how, supposedly, the image of the JE is reflected in the market, being used as an investment for knowledge, but not as partner agents capable of co-creating and innovating through collaboration. This indicator is in line with another study that analyzed the skills developed by students from a Junior Enterprise headquartered in Minas Gerais, creativity and innovation in only 13% of the students surveyed (VALADÃO; DE ALMEIDA; MEDEIROS, 2014). The result of both studies may represent that managers are unaware of the possibility of JE acting in the development of innovation, or that there is a lack on the part of Junior Companies to stimulate and promote innovation behavior, indicating this possibility for their partners.

This partnership process between the academic and business worlds usually follows some main phases. First, there is a dialogue, which intensifies in the coexistence, until reaching the point of identification with the external organizational culture and mutual trust. Some ways to initiate dialogue are: participation in congresses, exhibitions and fairs; visits to companies; visits by entrepreneurs to university research centers etc. (LEMOS; CARIO; DE MELO, 2015). It is worth mentioning that the sectors of activity with the most intense interactions with research and science in general are those related to genetic engineering, organic and inorganic chemistry, food technology, biotechnology, laser technology and microelectronics (RAPINI; CHIARINI; BITTENCOURT, 2015).

(B) Benefits for agents involved

Recovering the perspective of the National Innovation System, Johnson and Lundvall (2005) argue that in the learning economy, personal contact and interaction are emphasized as a basic way to gain access to new knowledge and technologies. Cassiolato, Campos and Stallivieri (2007) reinforce that learning processes are not restricted to formal research and development activities, but also those forms and mechanisms that enable interactions between companies and other agents. Junior Companies benefit the students involved as they use "*learn by doing*" as their main justification, enabling them to enter the labor market with a more prepared professional, with entrepreneurial skills and competences (VALADÃO; DE ALMEIDA; MEDEIROS, 2014).

As a benefit for the universities in which the JEs are inserted and for the companies that collaborate, since the junior students are supported by guiding professors, the role of intermediary agent of the JEs is highlighted in the face of the E-I interaction, as it is made

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possible a professor (university) - manager (company) relationship based on Junior Enterprises (TABLE 4).

Table 4 Benefits for EU

Agent	Benefits	Speech excerpts*
Companies	Contact with HEIs research and knowledge	"It is possible that partner companies have great contact with university students, which provides them with greater contact with the University and with the laboratories and innovations it provides without so much bureaucracy or large investments." (R6)
	Access to cost-effective products and services	"I believe that the quality of the projects generated by junior entrepreneurs is one of the main factors that bring partner companies and university clients together." (R9)
	Prospecting for employees	"For partner companies, the approximation with the University creates the opportunity to select talents to be collaborators." (R21)
	Strengthening the Company's image	"Adding the fact that the partnerships provide greater credibility within the market situation for JE, thus making its name more exposed, together with that of the educational institution, for the commercial work environment." (R1)
Universities	Brings students closer to the market	"JE generates value for educational institutions because it is often focused on covering the 3 pillars of education internally, without being able to look to the external environment, so we make the external environment contribute to the institution in Teaching, Research and Extension" (R35)
	Greater employability of students	"They generate value, in my view, bringing companies closer to the reality of the university and facilitating the acquisition of internships." (R20)
	Strengthening the university's image	"The JEs in general take the name of the university when they go to talk to businessmen, which helps to propagate the institution and how it operates and is needed in society, which only generates greater recognition for the institutions." (R27)
	Course enhancement	"(JE) becomes a differential for the course and, therefore, for the institution." (R5)
	Meet society's demands	"It is a catalyst for educational institutions to develop education in line with market needs." (R26)
	Fostering entrepreneurship	"Foster entrepreneurship at graduation, since nothing is taught in the normal grade." (R11)

Source: Survey data.
*The excerpts were taken from the answers to the open questions of the questionnaires.
R: Respondents

As can be identified in the responses of junior entrepreneurs (Table 4), these interactions, in their different forms, result in countless benefits for HEIs and their community, for companies and for the national innovation systems as a whole. Companies seek this type of interaction because they perceive the possibility of responses, from science, to market challenges (CLOSS; FERREIRA, 2012). This occurs, as universities can expand the industry's capacity to develop technologies at a lower cost, in a shorter period of time and with reduced risks, when they enable access to new knowledge (in addition to a set of talents

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and skills) in the scientific and technological areas (FISCHER *et al.*, 2018; PUFFAL; RUFFONI; SCHAEFFER, 2012). As additional benefits for companies, the following can be mentioned: attracting highly qualified and specialized human resources; solving technical problems; access to public resources; and increased complexity and speed in the development of new technologies by the company itself (NOVELLI; SEGATTO, 2012).

For educational institutions, E-I interaction provides institutional advantages, as well as personal and professional opportunities for their students and staff. Some of the benefits for HEIs are: raising additional resources for research and teaching; assistance in the university's social contribution to regional economic development; greater access to market reality through partner companies; publicity of the university's image; access to modern infrastructure; greater employability of academics (NOVELLI; SEGATTO, 2012); in addition to the possibility of providing education linked to technological advances to the institution's students (PUFFAL; RUFFONI; SCHAEFFER, 2012).

Although the benefits are widely recognized, there are substantial barriers to successful collaboration and knowledge exchange between universities and companies, which can lead to low productivity and quality (BRUNEEL; D'ESTE; SALTER, 2010). Many companies stop looking for educational institutions because they assume that the bureaucracy of this type of organization will be an obstacle. There are also arguments related to academic productivism, subordination of science to the market and inequality in access to research results (BERNI *et al*., 2015).

Other factors that can hinder University-Industry Interaction are: level of project uncertainty; geographical distance between agents; duration of projects; lack of government support; different objectives (NOVELI; SEGATTO, 2012), cultural conflicts, poorly conceived reward systems and ineffective management of university technology transfer offices (SIEGEL *et al.,* 2003), extension of process time; lack of legal instruments that regulate cooperation research activities; different administrative philosophies; lack of communication between the parties; distrust of the capacity of human resources in both institutions (AZEVEDO, 2016). One of the ways to mitigate these barriers is through intermediary organizations that cross the boundary between academia and industry in different ways, bringing them closer (VILLANI; RASMUSSEN; GRIMALDI, 2017).

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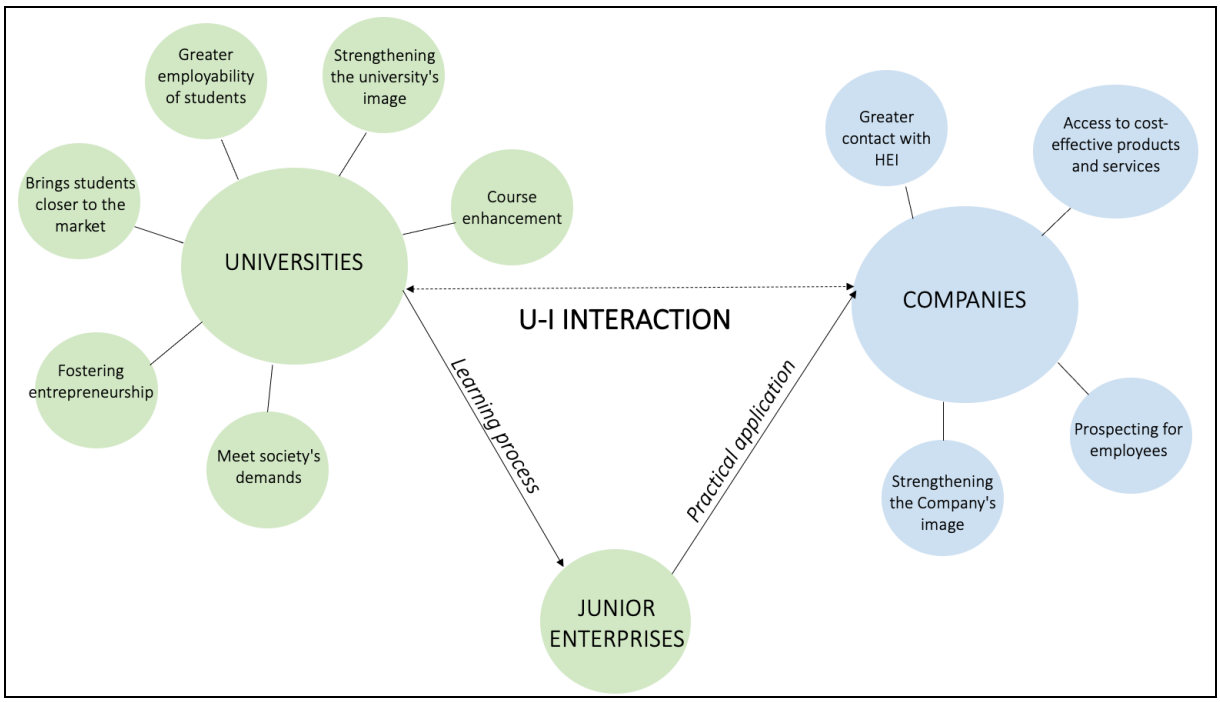
Figure 3 Main benefits EU: JEs as intermediaries



Source: Prepared by the authors.

5 FINAL CONSIDERATIONS

This article sought to investigate how junior enterprises act as agents of university-industry interaction in the state of Santa Catarina. To fulfill this objective, a case study was carried out with the Federation of Junior Companies of Santa Catarina (FEJESC). Of the 50 companies federated to FEJESC, 37 responded to the survey, to describe what types and forms of interactions are conducted with companies in the market. It was verified the existence of different forms of interaction between the JE and the market companies, which were divided into two types: commercial relationships and partnerships. Furthermore, the benefits of the exercise of junior companies for universities, companies and for the strengthening of the U-I relationship were identified.

It is concluded that junior companies have the potential to be placed as an intermediary mechanism for the development of U-I interaction and, despite this, they are neglected both in educational institutions and in the literature dealing with this theme. As a result, the role of JEs in promoting and bringing together universities and companies is highlighted, an initiative that should be encouraged as it complements teaching by using the precepts of *learn by doing*, an activity which in turn is placed as an element central part of a National Innovation System.

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This article does not intend to characterize a definitive position, since the research faced limitations, such as a reduced number of respondents. It is recommended that future research deepen the results to assess similarities and differences in the forms of interaction between junior companies and the market, the benefits from the perspective of other actors (universities and companies) and the perception of educators in managing the movement, providing a diagnosis of faults in this educational system.

-CONTRIBUTIONS

The approximation between universities and companies has been a way found by several countries to adapt the trained human resources to the market reality, as well as to stimulate an environment in which knowledge generators and users can find better applications for institutional learning in favor of increase the competitive capacity of its society facing other nations. This approximation has been encouraged in various ways, from faculty consultations and the provision of technical services, to complex fixed interaction structures, such as technology parks and business incubators in the university environment.

In fragile National Innovation Systems, the institutional conditions for learning and disseminating knowledge are fragmented and scarce. In the case of Brazil, companies participate with a minority share of the total investment in S&T investment, revealing the actors' low commitment to technological issues. On the part of universities, resources are already directed primarily to teaching, in an attempt to minimize institutional failures and the distance with business actors, except in isolated centers of excellence.

Based on the results of this research, Junior Enterprises present themselves as an effective mechanism to increase and promote the U-I relationship. This mechanism, in addition to bringing universities and companies closer together, consolidates the learning process, improving the skills and abilities of future professionals in various areas. While the university, in the role of professors, is committed to guiding junior entrepreneurs, companies can choose to collaborate in different formats (commercial and partnership).

This work sought to provide qualitative evidence that the role of a mediating agent in the U-I relationship, although far from solving the structural problems of S&T in fragmented systems, can create a fertile environment for ideas and projects that contribute to alleviating the institutional deficiencies typical of countries under development. With relatively few resources, it is possible to create mechanisms that induce permanent interaction between

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researchers and entrepreneurs, in order to implement a culture of searching for new ways to combine old factors.

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