

## BIBLIOMETRIC ANALYSIS OF THE ANPROTEC CONFERENCE ANNALS

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## ABSTRACT

The paper aims to analyze the characteristics of the publications of the annals of the conferences of the National Association of Entities Promoting Innovative Enterprises (Anprotec). We analyzed 201 papers published in the annals of Anprotec from 2013 to 2016, considering the intellectual distribution of researchers and other actors involved, their productivity and links with institutions, including the development of positive points and improvement of results. It was registered the presence of 147 institutions, 516 authors, and 24 thematic ones in the production and publication of the papers that constituted the sample searched. This study revealed the presence of different institutions, private and public organizations, characterizing the dissemination of the thematic in the productive spheres, academia, and government. Publications spread in geographic regions in Brazil, with a higher concentration in the Southeast, South, followed by the Northeast and Central-West. The most discussed themes were: entrepreneurship, incubators, innovation, innovation habitats, technological and multidisciplinary parks. In the years 2015 and 2016, the presence of emerging themes was registered, involving planning and management. Regarding the research findings, the emphasis is on the importance of innovation habitats to promote the entrepreneurial development of different regions.

**KEYWORDS:** triple helix; technological parks; incubators; innovation; multidisciplinary.

## ESTUDO BIBLIOMÉTRICO DOS ANAIS DA CONFERÊNCIA ANPROTEC

## RESUMO

O estudo objetiva analisar as características das publicações dos anais das conferências da Associação Nacional de Entidades Promotoras de Empreendimentos Inovadores (ANPROTEC). A pesquisa bibliográfica e documental, associada às técnicas bibliométricas descritivas, norteia o estudo no que tange aos métodos. Foram analisados 201 artigos publicados nos anais da ANPROTEC de 2013 a 2016, considerando a distribuição intelectual de pesquisadores e demais atores envolvidos, a produtividade destes e suas ligações com instituições, incluindo os pontos positivos e a melhorar. Registra-se a presença de 147 instituições, 516 autores e 24 temáticas na produção e publicação dos artigos que constituíram a amostra pesquisada. Revela-se a presença de diferentes instituições, caracterizando a disseminação da temática tanto nas esferas produtivas, quanto na academia e governo. As produções se difundem em regiões geográficas pelo Brasil, com maior concentração no Sudeste, Sul, seguida pelas regiões Nordeste e Centro-Oeste. As temáticas mais abordadas: empreendedorismo, incubadoras, inovação, habitats de inovação, parques tecnológicos e multidisciplinar, contudo, nos anos de 2015 e 2016, registrou-se a presença de temas emergentes, envolvendo planejamento e gestão. Acerca dos achados da pesquisa, o destaque fica com a importância dos habitats de inovação para a promoção do desenvolvimento empreendedor das diferentes regiões.

**PALAVRAS CHAVE:** tripla hélice; parques tecnológicos; incubadoras; inovação; multidisciplinar.

## 1 INTRODUCTION

Innovation is driven by the ability to establish relationships, detect opportunities, and take advantage of them. It does not consist of only opening up new markets; it can also mean new ways to serve already established markets. Technology plays an important role with regards to innovation, because it enables us to reach higher levels of acceptance in the market. It can benefit people through tools in order to improve the provision of services, products, and, consequently, the quality of life.

As an element of competitiveness, innovation demands systematic investments to meet market demands, because the company's driving force is the innovation agent, leading the public power to adopt wider Science, Technology, and Innovation (ST&I) policies, expanding its roles and encompassing its performance as a liaison among universities, research centers, and companies (ETZKOWITZ; LEYDESDORFF, 2000; DUDZIAK, 2007).

The systematization of investments and active liaison of the interested parties, listed in the "Green Book of the Science Technology and Innovation Conference" in 2001, consider the challenges of institutions and points out political actions focused on ST&I (BRASIL, 2001). In this regard, there was a significant effort, at a national level, to discuss and approve, at the National Congress, a Law that encompassed innovation. This accomplishment was achieved with the Law n. 10.973, from December 2<sup>nd</sup>, 2004 (BRASIL, 2004), as a regulatory landmark for ST&I. It highlights the importance of public policies for innovation as a factor for development and competitive (STAL, 2008; CALZOLAIO, 2011; TEIXEIRA; HOLTHAUSEN; MORÉ, 2015).

With the Brazilian law, incentives to innovation, scientific, and technological research in the productive environment were established (BRASIL, 2004). From this initiative, important repercussions arose in the Brazilian states, aiming to facilitate and regulate innovation practices. The challenge was to create conditions for innovative activities to meet the demands of different sectors of society, strengthening the companies' global competitiveness – technological parks, innovation centers, and technological extension networks – stimulated by public policies (BRASIL, 2010).

Brazilian data show that 77.78% of the federative units have ST&I initiatives. Machado and Ruppenthal (2014) indicate that the Innovation Law needs to be better comprehended by its operators in order to ensure the proper functioning of innovation system. The Innovation Law, by itself, is not enough for Brazil to effectively achieve economic and social development; however, it is a landmark with regards to innovation (BRASIL, 2010; MACHADO; RUPPENTHAL, 2014).

Science, technology, and innovation are valuable sources of economic and social transformations worldwide. The search for new possibilities to turn knowledge into innovation – and, consequently, on wealth – encompasses countless actors today. In addition to government, it

involves society as a whole, represented by academia, corporate sectors, professional entities, third sector entities, among others (BRASIL, 2010).

In this scenario, we consider the National Association of Entities Promoting Innovative Enterprises (Anprotec), which has performed in Brazil since 1987. Its goal is to represent the interests of organizations that focus on innovation and entrepreneurship, such as incubators, technological parks, accelerators, education and research institutions, public agencies, and other entities related to entrepreneurship and innovation. Anprotec assumes a prominent role in the Brazilian scenario, promoting qualification activities, liaising public policies, generating and spreading knowledge in a sustainable way, by strengthening companies based on knowledge (ANPROTEC, [s.d.]).

This organization provides a wide range of discussions on innovation, promoting the advancement of the subject in the academic, corporate and government environments. Studies show that Brazil is decreasing its technological dependence. They also provide subsidies for decision-making with regards to investments and public policies focused on science, technology, and, especially, innovation development in Brazil (BRASIL, 2014).

Encouraging integration between academia and the productive sector is one of the Anprotec's priorities. Anprotec also encourages and guides the qualification and development of mechanisms to generate innovative enterprises, such as company incubators, business accelerators, and coworking environments. The offer of environments that foster the creation and development of innovative businesses is a relevant tool in boosting economic, technological, and social development (ANPROTEC, 2016). In this sense, this research aims to analyze the characteristics of the publications of the annals of the conferences of the National Association of Entities Promoting Innovative Enterprises from 2013 to 2016.

## **2 MATERIAL AND METHODS**

This research is defined as a bibliometric study and it has a bibliographic and documental focus, with regards to its methodological procedures. The bibliometric analysis is a counting methodology for bibliographic content, and it focuses on tracking publications, words, quotes, references, sentences, authorships, and co-authorships. This method is based on the number of times the respective terms appeared in the publications that contain the monitored terms (YOSHIDA, 2010).

Using software, the bibliometric analysis enables to create social networks. Nishi and Lobler (2017) and Costa et al. (2018) point out social network analysis as a tool that is able to understand the connections between different actors and contexts. They also indicate that the use of the Ucinet software enable to widen data interpretation and a understanding of the connection of “network

nods”.

In this research, we cataloged the scientific papers available at the Anprotec website from 2013 and 2016, totaling 201 papers. Then, the data were tabulated, with the title, research objectives, researchers, institutions, keywords, subject, eventual findings, and research gaps. As to the data analysis, we used the Ucinet 6 software for Windows.

### 3 RESULTS AND DISCUSSION

The results shows that, for the 201 published paper that compose the analyzed sample, 516 authors and 147 education and research, government, and social institutions were involved in the discussion of 24 subjects in this research. Table 1 present the frequency of annual production, considering the analyzed sample.

**Table 1** - Annual production in the Anprotec annals from 2013 to 2016

Year	Number of papers	Number of authors	Number of institutions
2013	64	172	75
2014	42	117	39
2015	42	122	43
2016	53	168	48

Source: Developed by authors (2018).

With regards to the participation of authors in the publications, Table 2 shows the number of authors and their respective productions by year. It is possible to note that the production over time is, in its majority, only one paper per author. This panorama indicates the low frequency in production by author/year, considering the researched sample. There was a significant increase in the number of authors that published two papers in 2016 (15). In 2016, one author published 11 papers.

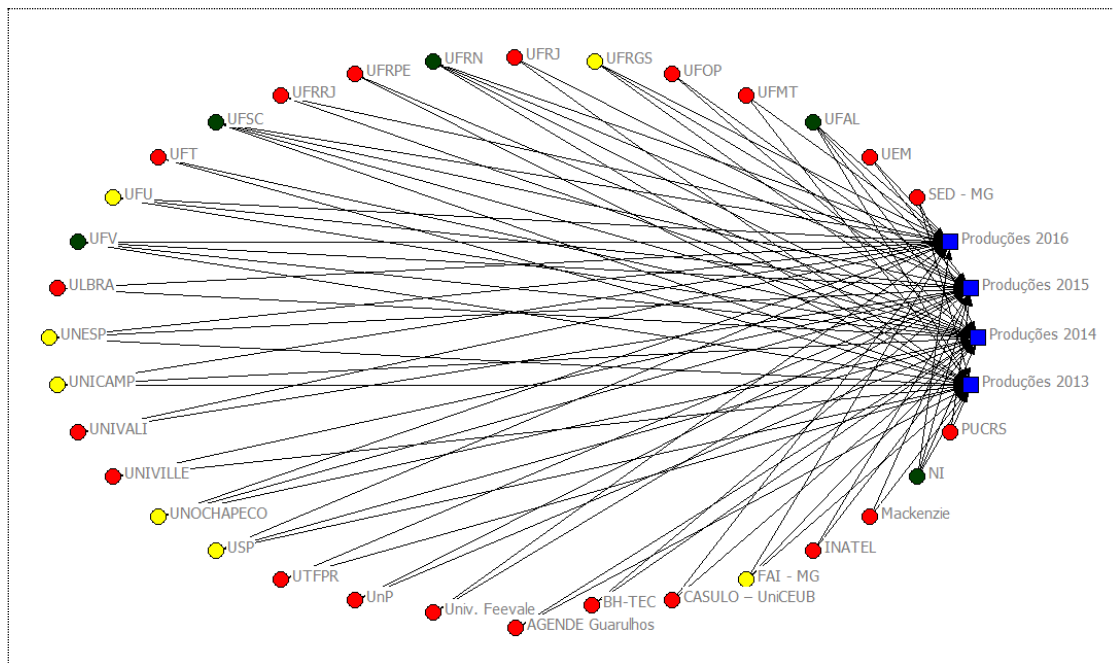
**Table 2** - Number of authors/year per paper in the Anprotec annals from 2013 to 2016

Year	1 paper	2 papers	3 papers	4 papers	11 papers
2013 - Authors	158	12	1	1	0
2014 - Authors	109	8	0	0	0
2015 - Authors	110	10	2	0	0
2016 - Authors	148	15	1	2	1

Source: Developed by authors (2018).

Table 3 presents the number of authors and their productions in an integrated way, that is, the authors' production with three or more publications during the analyzed period.



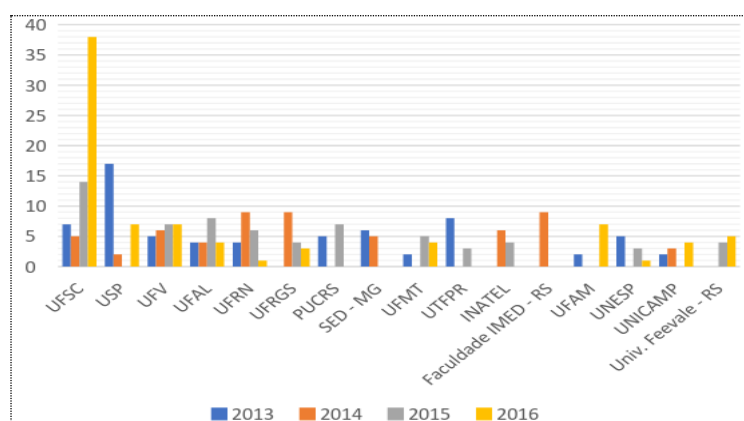


**Figure 2** - Institutions with two or more productions in the Anprotec annals from 2013 to 2016  
 Source: Developed by authors through the Ucinet software (2018).  
 Note: NI – Non-identified Institutions.

It is observed that, out of the 147 institutions involved in the analyzed productions, most (115) have a publication record in only one of the years, four institutions have publications from 2013 to 2016 (green), seven institutions participated in three years (yellow), and 20 institutions have publications in two years (red). The institutions with the most publications throughout the analyzed period are: Federal University of Santa Catarina (UFSC), Federal University of Viçosa (UFV), Federal University of Rio Grande do Norte (UFRN), Federal University of Alagoas (UFAL). In 2013, there was a higher participation of different parties in the productions, and there was also a higher interlocation between the academia and different segments, such as government entities (three spheres), productive sectors, and innovation habitats. This movement was not maintained in the following years, in which there was higher participation of academia. The records show that the discussion in academia is isolated, since there is no intense connection between the institutions, as shown by Figure 3.







**Figure 4** - Institutions and their researchers on the publications in the Anprotec annals from 2013 to 2016  
Source: Developed by authors (2018).

Table 4 shows the subjects discussed in the 201 papers published in the Anprotec annals from 2013 to 2016.

**Table 4** - Subjects addressed in the Anprotec annals from 2013 to 2016

Subjects	2013	2014	2015	2016	Total
1 Entrepreneurship	6	4	13	15	38
2 Incubators	10	6	4	7	27
3 Innovation	5	12	6	3	26
4 Innovation habitats	11	3	5	3	22
5 Technological parks	15	1	3	3	22
6 Multidisciplinary	6	6	-	7	19
7 Creative economy	1	1	2	1	5
8 Innovation systems	1	2	2	-	5
9 Innovation management	-	3	-	1	4
10 Startups	1	-	2	1	4
11 Technology and innovation	2	2	-	-	4
12 Clusters	3	-	-	-	3
13 Strategic planning	-	-	1	2	3
14 Sustainability	-	-	2	1	3
15 Accelerators	-	-	-	2	2
16 APL (Local productive arrangement)	-	-	-	2	2
17 Design thinking	-	-	1	1	2
18 Solidarity economy	1	-	-	1	2
19 Triple helix	-	-	-	2	2
20 Innovation laws	-	-	1	1	2
21 Creative cities	1	-	-	-	1
22 Regional development	1	-	-	-	1
23 Knowledge management	-	-	-	1	1
24 Strategic management	-	-	-	1	1

Source: Developed by authors (2018).

It is possible to observe that, in total, 24 subjects are present in the 201 papers that comprise the sample of this study. Some subjects are more numerically expressive and continue to be addressed annually in the publications: entrepreneurship (38), incubators (27), innovation (26), innovation habitats (22), and technological parks (22). The others indicate emerging topics that are discussed in the context of innovative entrepreneurship. We highlight the multidisciplinary topic (19), which discusses cooperation, organizational structure, business plans, among others, in the different contexts of entrepreneurship and innovation.



We note that there are emerging subjects in the publications from 2015 to 2016, such as strategic planning, sustainability, accelerators, design thinking, triple helix, and innovation laws. These subjects are considered to be crucial to promoting an innovative culture in organizations and society, since they involve the actors of organizational and social process to carry out actions of entrepreneurship and innovation.

We summarized the main remarks from the analyzed publications (Table 5), regarding the topics: innovation habitats, triple helix, technological parks, incubators, innovation, innovation management, and multidisciplinary, bringing the positive points shown in the research papers and improvement suggestions given in the publications.

**Table 5** - Topics addressed in the Anprotec annals from 2013 to 2016

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<b>Innovation habitats</b>
<b>Positive points</b> The levels of interactivity in the existing communication policy in the innovation environments are mature; Support to small and medium-sized enterprises, support to company and innovation management practices, development of favorable conditions for companies, and flexibility when addressing bureaucratic matters; A better understanding of the concept of favorable alliances to companies, especially micro and small-sized organizations, an understanding that the best way to increase competitiveness is through cooperation.
<b>Points to be improved</b> Impacts on innovation habitats and society are still modest; Targeted work, which also shows the practical dimension for promotion events that brings together companies, incubators, and institutions, and the advantage of using intellectual property to enter the market.
<b>Triple helix</b>
<b>Positive points</b> Innovation enterprises convert into territorial poles of irradiation of new productive and social processes.
<b>Points to be improved</b> The widespread of the innovation culture in the agents that make up the triple helix of socioeconomic development (universities, companies, and government sectors) is the core bottleneck with regards to the diffusion of innovation culture in Brazil; The lack of integration among companies, government, and universities hinders the synergy among actors, elements, and actions that should make up the innovation environment; Innovation enterprises need a legislative review that accommodates the public-private vocation of these enterprises, preventing the deterioration caused by a lack of clear legal framework.
<b>Technological parks (TP)</b>
<b>Positive points</b> Initial discussions about TP are in very early stages, because they discuss basic infrastructure, financial feasibility, fields of performance, physical spaces, and more consistent local policies to support ST&I; TP are tools to promote sustainable development, and are agents that integrate entrepreneurship, innovation management, and local, regional, and national development where they are deployed, with own features, defined roles, and locus of business knowledge; Potential for transforming urban planning, facing challenges faced by cities with regards to their development, and improving quality of life of the citizen; TP Induce public policies at city level to sensitize other organizations to focus on city development; Innovation environments, deployed in developed and developing countries to dynamize economies, providing knowledge of technological innovation; TP promote innovation and competitiveness, as well as an increase in corporate education, based on the transfer of knowledge and technology through the interaction among the parties involved in their environment. Innovation habitats spread throughout the state of Santa Catarina will contribute to the goal of overcoming and strengthening the process, taking innovation to remote areas of the state.
<b>Points to be improved</b> Most loans come from the Brazilian government, there is a need to increase partnerships when raising resources; The management of TPs in Brazil is mostly supported by fundraising in the public sphere; Poor or developing regions need for TPs to contribute to their development; The fundraising for management and university demands to meet the TP needs.

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## **Incubators**

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### **Positive points**

It fosters and strengthens the company for the post-incubation period, preparing it to compete in the market on its own, generating higher success rates in a shorter period;

Standardizing the processes brings favorable results both for incubators and incubated companies;

Mechanisms that can generate synergies among different agents of the local economy, considering the proposed innovation strategy, which encompasses local development;

It enables integration of universities with scientific and technological potential;

Incubators linked to universities (public or private) have been successful in consolidating innovative ideas;

Lead the positioning in the incubated companies, either by its technological features or by its connection with universities;

Ability to incorporate actions and professionals from different areas of knowledge. It is a space in which the university intends to generate multidisciplinary knowledge, besides solving problems in society.

### **Points to be improved**

Low participation of companies in bids to promote innovation. Rigorous selection criteria, short deadlines, and a high level of regulatory complexity;

Incubated companies have difficulties in accessing the market when compared to their competitors;

Understanding of the researcher with regards to the methodology to be implemented and developed for the company incubator;

Improve sustainability indicators through consultancy, development of business plan, client prospection, marketing strategies, process management;

Management and financial ability.

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## **Innovation**

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### **Positive points**

Innovation culture preaches less hierarchical authority and more autonomy to those who are led, aligning to the new communicational paradigms based on symmetry, collaboration, and interactivity;

Important factor for incubation programs based on technology, according to the guidelines for the selection of new enterprises;

Activities aimed at spreading knowledge promote innovation processes, which is a key element for technological development.

### **Points to be improved**

Understanding innovation as a process that needs to be managed, and not as an isolated event;

Engagement of the team for the evolution of the innovation process, besides the involvement and direction of the organization's senior management.

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## **Innovation management**

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### **Positive points**

The creation of a multidisciplinary team is essential, avoiding a high turnover and providing more commitment.

### **Points to be improved**

Qualification of human resources and production management;

Specialized and specific staff for each role to be performed in innovation projects;

Reduce team turnover in the technological innovation cores, because it hinders the retention of knowledge in the organization;

Prospect career plans to retain talents in innovation environment;

Expand the discussion on innovative entrepreneurship in different levels of educational environments.

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## **Multidisciplinary**

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### **Positive points**

Hobbies can be encouraged as a source of self-knowledge and experimenting skills and competencies – and it can lead to business ideas;

Startups are new company models that need to have a communication process that enables their legitimacy in market and in society.

### **Points to be improved**

National unified information devices to improve the innovation process with strategies and tools that can reach target audience;

Procedures to internationalize the processes, as well as their promotion;

Knowledge for the negotiation between the faculty and the company, to consolidate the marketing potential of the research;

Communication between business entrepreneurs, faculty, and institutions, making processes faster and more efficient, also creating trust among parties.

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Source: Authors (2018).

Table 5 presents the main remarks in the final considerations of the 201 analyzed papers. The positive points and the points to be improved in the given topics regard the achievements of interactions between the different parties involved in the process throughout the years. It was marked by many achievements in the cultural context of innovative entrepreneurship, which generate habitats to promote the debate, the articulation of the triple helix and, and the establishment of actions that lead to the development of the country.

With regards to the points to be improved, these should be considered for continuous growth, since they are records of consolidated experiences that can reverse actions in progress and redirect them or strengthen existing actions. It can be inferred that they are lessons learned, which enable to consolidate actions already executed or in progress.

#### **4 FINAL CONSIDERATIONS**

Considering the Anprotec annals from 2013 to 2016, we presented the number of publications, list of authors, institutions, and the relation among the researchers involved in the sample publications, with the analysis of authorship and co-authorship network. With respect to the publications, the most addressed subjects were: entrepreneurship, incubators, innovation, innovation habitats, technological parks, multidisciplinary. These subjects are considered key for the promotion of innovative culture in organizations and society, since they involve the actors of the organizational and social process for the attainment of entrepreneurial and innovative actions.

A summary of final remarks of the analyzed publications, with the positive points and points to be improved, shows that the advances in terms of entrepreneurship and innovation in Brazil have been established. The main advances refer to the importance of innovation habitats to the promotion of a culture of entrepreneurial development in different regions, making them more competitive and promising. On the other hand, the indication of points to be improved encompasses financial aspects and qualified human resources to promote innovative entrepreneurship in different regions.

This research contributed to the academic environment and to the National Association of Entities Promoting Innovative Enterprises (Anprotec). It showed the trends for discussion in the innovation environments, as well as it promoted the widespread of entrepreneurial culture with regards to innovation and its contexts. It also pointed out the emerging themes in the studied sample. We suggest broadening the research locus, contemplating other scientific productions, to confront data on entrepreneurship and innovation.

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All authors stated that they had: a) actively participated in the discussion of the results; and b) Review and approval of the final version of the paper.

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