

# University and its role in regional development: a mapping of the theme according to the delimitations posed by researchers

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## Abstract

The objective of this study is to map the theme 'University and regional development'. The instrument used to carry out the research was the Knowledge Development Process Constructivist (Proknow-C) in order to support this research in qualitative and quantitative analysis of articles with scientific recognition and relevant to the proposed theme. Thus, a set of articles was sought through a structured process, in international databases, in which the use of bibliometric analysis techniques was applied to show publications on the subject. From this study, the following results were identified: (i) elaboration of a bibliographic portfolio composed of 19 international scientific articles aligned with the theme; (ii) bibliometric analysis allowed the identification of the main authors, articles, journals and main keywords related to the subject.

**Keywords:** University. Regional Development. *Proknow-C*.

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## 1 INTRODUCTION

The discussion about the role of universities in regional development is recent, but there is an increasing number of supporters of the ideas that address the relationship between university and society. It is known that they are considered key elements for the development process (KARLSEN, 2005) and, in recent years, they receive strong attention from the government in the elaboration of public policies that foster their expansion. Education, scientific research, extension and technological innovation are activities they develop, which gives universities an influence within the economy (BENNEWORTH; NIETH, 2017).

The basis of development does not refer only to economic issues, but to human and social development, a development that articulates the dynamization of economic growth with other factors, such as: the growth of human capital, the growth of social capital, the conquest of governance, production of knowledge infrastructure and the sustainable use of natural capital (DRUCKER; GOLDSTEIN, 2007).

Universities assume a humanistic and transforming function, due to their ability to deal with complexity and, (BENNEWORTH; NIETH, 2017) because they are able to generate integration to process the links and interdependencies that exist between the various dimensions of development. Thus, the role of the university is decisive in regional development as the relations established between the agents (universities, companies and civil society) demonstrate the commitment to local issues, forming a cooperation network (ETZKOWITZ, 2000). Such importance of the university's role regarding development leads to the investigation of the phenomenon by the scientific community.

To form a scientific discourse capable of reflecting a position on a given topic, a wide range of knowledge relevant to the discussed object is necessary. Afonso

*et al.* (2011) attribute to the literature review an essential role to assess the research topic relevance.

To conduct a literature review of a specific theme, lenses and filters must be delineated by the researcher, considering the scope of materials found. These require well-defined criteria capable of minimizing non-essential information to the desired knowledge (AFONSO *et al.*, 2011).

In this sense the following research question emerges: "How to map the theme 'The role of the university in regional development'?".

Therefore, the main objective is to map the theme 'the role of the university in regional development'.

In order to achieve the objective of the present research, it will be necessary to:

- (i) Select a set of articles to compose a Bibliographic Portfolio of the proposed theme; and
- (ii) Identify the highlights of the Bibliographic Portfolio for the variables: articles, authors and keywords.

This study relevance is in the illustration of the Proknow-C method, capable of contributing to researchers from different areas in the selection of bibliographic portfolio and bibliometric analysis. As a direct result, there is the method validation as an aid tool in the knowledge construction through the elaboration of a bibliographic portfolio relevant to the research theme, (LACERDA, ENSSLIN and ENSSLIN, 2012) selected under qualitative criteria and evaluations, seeking to maintain content with greater scientific representation to the developed theme.

Initially, this first introductory section on the research topic is presented. In section 2, the theoretical foundation is configured. In section 3, the methodology applied in the study is discussed in terms of the research methodological framework and

the used procedures. Subsequently, the steps for obtaining the bibliographic portfolio are highlighted and bibliometric analysis is carried out, as well as the exploration of the research results, and, finally, the final considerations are made.

## 2 THEORETICAL FRAMEWORK

The relationship between the university and its role in regional development is still a recent debate. In a global context, it was only after the crisis of the 1970s that higher education and research institutions entered as elements of concern for regional policies (GOLDSTEIN; GLASER, 2012).

Goldstein and Glaser (2012) point remarkable structural and functional changes in higher education institutions (HEIs), stimulated by the expansion of their assignments. A new environment model is needed that fosters knowledge and the generation of innovative ideas capable of actively contributing to the development of society. "In general, this process has been based mainly on the addition of a range of knowledge transfer activities (non-strictly) and market oriented, known as the university's 'third mission', to the teaching and research traditional areas" (KARLSEN, 2005).

Teaching and research are not the only roles played by universities. Karlsen (2005) states that higher education institutions generate direct regional economic effects from infrastructure investment, tax income, consumption, business investments with multiplying effects on the economy. In addition, the author cites the specific social and cultural effects of the region.

Drucker; Goldstein (2007) discuss other factors resulting from the installation of regional universities, among them, the labor training, support for innovation and research, development of technological

parks and elaboration of projects with impacts on urban development.

The development basis does not refer only to economic issues, as it contains aspects related to history, society and institutional issues that contribute to integral development of the population. To think about this concept of development is to relate it to improving people's lives and the freedoms they enjoy (CHIARELLO, 2015).

The concept of regional development highlights local relations and forms of integration as determining factors in the process of socioeconomic transformation in the regions.

Therefore, people's awareness is an extremely important endogenous variable, a fundamental condition to start a correct regionalization process, in which a regional development policy can be supported. [...] in this process, education, especially higher education, has a relevant role to play. Education is at the base of awareness and this in of participation. (CABUGUEIRA, 2000, p. 26)

The universities' old roles put them in a prominent position. However, their position in society has undergone changes (KARLSEN, 2005), as they require much more than qualified human capital. Universities appear as important agents of regional development and, for many, their new role started to be considered.

According to Gumbowsky (2015, p. 89),

it is also at this moment that the articulation between teaching, research and extension stands out. Through education, the university fulfills the role of transmitting knowledge, but this knowledge is produced through research. Knowledge needs to be socially produced and have meaning for the society where it is produced and for which it is intended. Thus, research needs to be aware of local issues. In addition to the teaching-research articulation, this knowledge needs to

extrapolate the university spaces, reaching the segments of society.

Goldstein and Glaser (2012) state that at the international level, the role of higher education institutions as agents in knowledge-based regional development has become widely recognized in political discourse. Different facets of this relationship are explored, including the “multiplier” impacts of employment, the migration patterns of graduates entering regional labor markets, as well as the effects of academic research on university-business links.

Universities are committed to being attuned to local issues by forming a cooperation network that fosters interaction between development agents (university, business and government), in order to adopt cooperative behavior and facilitate coordinated and based actions confidence. Etzkowitz *et al.* (2000) called this model of Triple Helix, which makes it possible to increase the commitment of universities with regard to the flow of knowledge and the contribution to innovation in regions where innovative policies are presented.

These agents benefit from the positive externalities transmitted by a university (HARRISON; TUROK, 2017). Among these, the human capital convergence and its influence on the formation of social capital is highlighted, given that knowledge is embraced by people who apply and disseminate it in their social relationships.

It is evident also, its role in attracting other forces promoting investments that enable economic growth and encourage the development of the region, encouraging new needs, joint ventures and linking it to the productive sector (MORAES, 2000).

HEIs must face the major challenge of not only being in the region, but also belonging to the region. This implies that they need to have an active entrepreneurial role in order to perform the role of interlocutor between the different regional,

national and even international agents, in order that this interaction can generate a learning process that leads to an increase in skills to be used within the region through innovative processes.

In the presented context, it is perceived the importance of selecting scientific productions capable of contemplating information and bibliographic data that support the presented theme. The dynamic characteristic of contexts and the coverage of different areas of knowledge have made the process of identifying relevant and recognized scientific knowledge complex, requiring the use of methods to build a greater understanding of the set of analyzed results. (AFONSO *et al.*, 2011).

In this sense, it is necessary to carry out a broader research through a structured literature review procedure, focused on recognized scientific publications that enable the construction of a bibliographic portfolio, a restricted set of relevant and scientific articles (ENSSLIN, S. *et al.*, 2014) and, subsequently, the accomplishment of a bibliographic analysis.

So, in this study, the instrument used for the fulfillment of the objectives proposed is the *Knowledge Development Process - Constructivist - ProKnow-C* which allows those interested in the theme to use the portfolio built for the preparation of future works.

### 3 METHODOLOGY

This section provides: (i) methodological framework; (ii) an instrument of intervention; (iii) procedures for bibliographic portfolio selection; and (iv) procedures for bibliometric analysis and results found.

### 3.1 Methodological Framework

The present research is characterized as exploratory, descriptive and of qualitative-quantitative nature.

While exploratory research, it seeks to support the researcher with knowledge related to the theme when generating information about the object of study.

Its descriptive character is characterized in the act of analyzing, registering and selecting the selected bibliography.

To this end, data collection was carried out by searching for scientific articles available in five international databases: *Scopus*, *Emerald*, *ProQuest*, *Science Direct* and *Web of Science*.

The research, in terms of addressing the problem, is qualitative, because when collecting the data, an assessment will be made regarding whether to remain in the bibliographic portfolio or not. The researcher's perspective is taken into account when choosing boundaries as needed (YIN, 2016). Secondly, a quantitative approach was adopted for the analysis of articles, authors, journals and keywords.

### 3.2 Instrument of Intervention

For the development of a research, it is necessary to search for relevant and updated knowledge that ensures the elaborated content legitimacy. The intervention instrument used in this research is the Knowledge Development Process - Constructivist (ProKnow-C),

from the Multicriteria Decision Support Methodology Laboratory - Constructivist (LabMCDA-C, from the Federal University of Santa Catarina, in order to provide the researcher with the objectives and limits placed on the bibliographic portfolio selection and bibliometric analysis in a structured and gradual way.

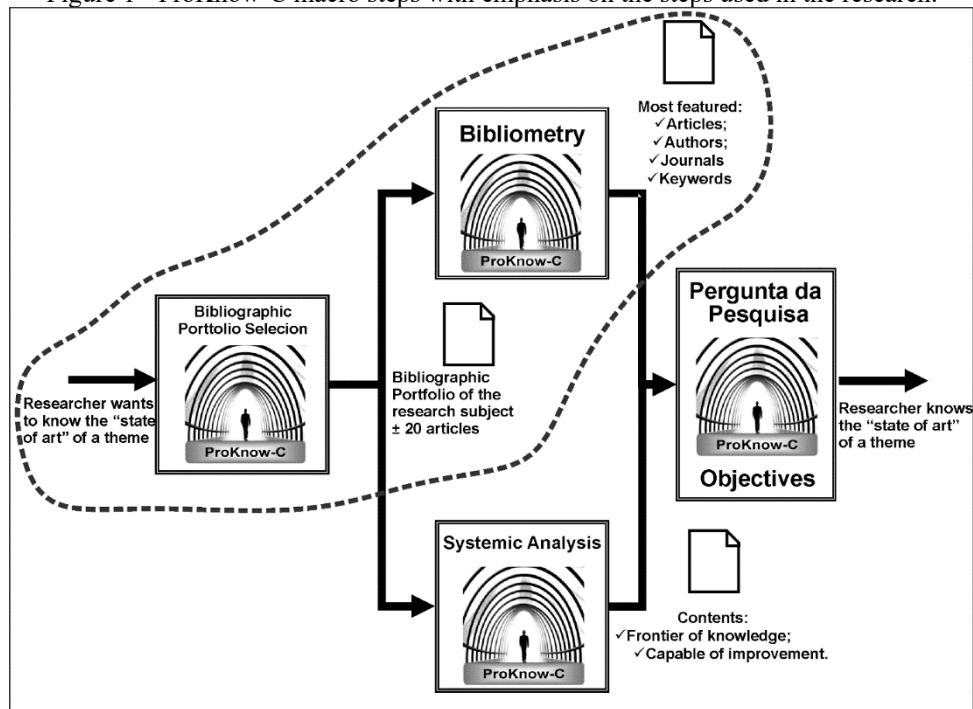
According to Dutra, A. *et al.* (2015, p.3),

It can be argued that Proknow-C aims to serve the following purposes: (i) assist the researcher to understand and establish the frontiers of knowledge for his theme; (ii) create conditions for the researcher to know and reflect on what has been published on his topic and the treatment given by the scientific community; (iii) show the researcher the gaps and alternatives for future research; and, (iv) generate subsidies for the researcher to justify the relevance, novelty and originality of his studies.

It can be seen, therefore, that the process generated by Proknow-C tool allows the researcher to select, through filters, materials from the specific literature that meet the scientific recognition necessary for the development of study themes.

The process is structured in four distinct stages: selection of bibliographic portfolio; bibliometry; systemic analysis; and, formulation of questions and research objectives (DUTRA; A. *et al* 2015), circumscribed in Figure 1. It takes into account the researcher's interests and boundaries, giving him the ability to adjust, according to his needs.

Figure 1 - ProKnow-C macro steps with emphasis on the steps used in the research.

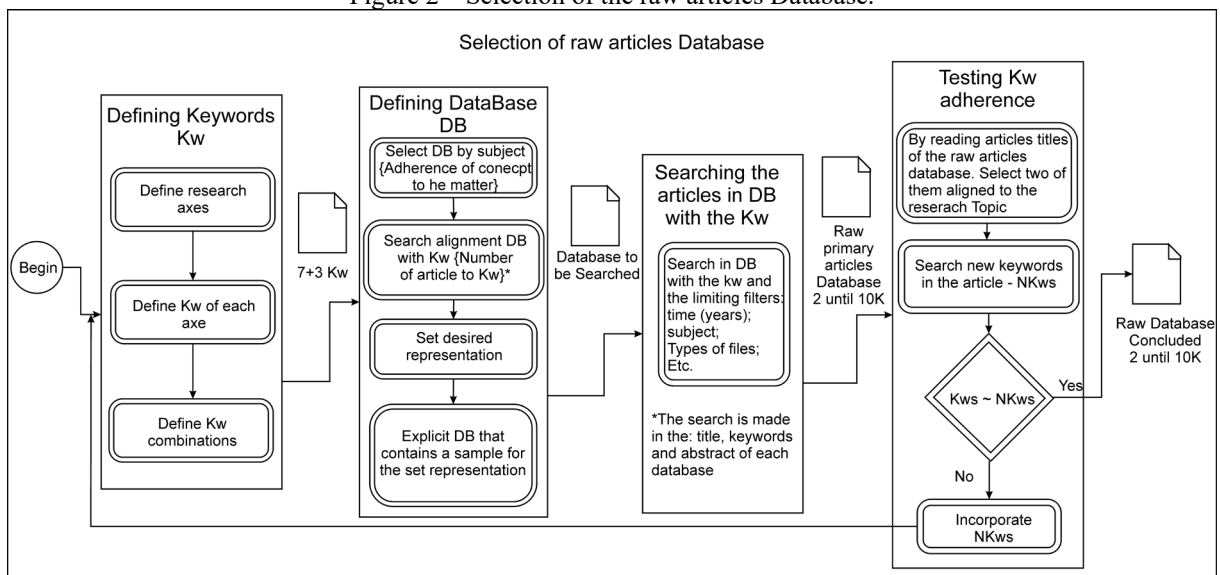


Source: Ensslin *et al.*, 2014.

In the developed study only the phases of Bibliographic Portfolio Selection and Bibliometry will be contemplated. The first phase has the purpose to define a

research referential related to the research theme (ENSSLIN, S. *et al.*, 2014). This phase is developed by means of a sequential set of filters, observed in Figure 2.

Figure 2 – Selection of the raw articles Database.



Source: Ensslin *et al.*, 2014.

It appears that the Bibliographic Portfolio selection consists in the selection of the Raw Database of Articles, through a series of sequential filters. The research

axes are delimited, which represent the research sub-themes (ENSSLIN *et al.*, 2014), and the respective keywords that represent them. Subsequently, databases are

selected when testing the adherence of new relevant keywords in a sample of articles (ENSSLIN, S. et al., 2014). In the filtering phase of Raw Database of Articles, a selection is made as to the number of citations and the adherence of titles, abstracts and, finally, full reading.

The next phase developed by the *Proknow-C* is called Bibliometric Analysis. The same is understood as a “process of quantitative disclosure of statistical data from a defined set of articles for information and scientific knowledge management of a

given subject, carried out by counting documents” (ENSSLIN et al., 2014, p. 7).

For the purposes of this work, the Bibliometric Analysis showed prominent variables in the Bibliographic Portfolio and respective references, demonstrated in Table 1. The Bibliometric Analysis of Bibliographic Portfolio references is considered for the information confrontation purposes, expanding the horizon of disclosure (ENSSLIN et al., 2014).

Table 1 - variables considered in the Bibliometric Analysis.

Description	Journals	Articles	Authors	Keywords
Portfolio Articles	X	X	X	X
References of Portfolio Articles	X	X	X	

Source: Adapted from *Ensslin et al., 2014*.

It is necessary to emphasize that, due to the active participation of the researcher and, consequently, the presence of subjectivity, two researches with an interest in the same subject may generate different bibliographic portfolios (BP), justified by the fact that there are different delimitations and motivations used by each of the researchers (DUTRA et al., 2015).

#### 4. RESULTS

Below are the procedures followed to obtain the Bibliographic Portfolio in subsection 4.1 and the presentation of

Bibliometric Analysis in subsection 4.2, with realization guided by the methodology described above, in order to consistently reach the proposed objective.

##### 4.1 Selection of Bibliographic Portfolio

The Bibliographic Portfolio selection of international articles on the theme University and its role in regional development took place between the months of March and April 2018, which began with the definition of the research axes, followed by the choice of keywords used in database search engines, as Table 2.

Table 2 Research axes and Keywords

Research Axes		
<b>1. Social Innovation</b>	<b>2. Regional Development</b>	<b>3. Universities</b>
	KEYWORDS	
<i>social innovation</i>	<i>social development</i> <i>regional development</i>	<i>universities</i> <i>higher education</i>

Source: Data from the survey (2018)

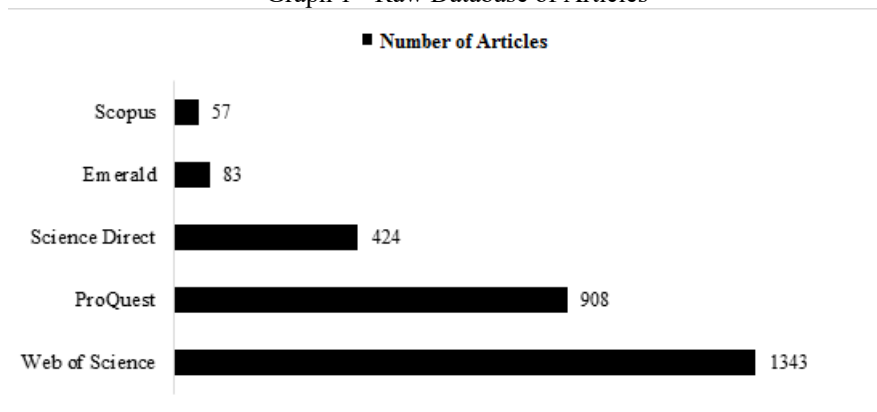
For this study, three axes that guide the execution of the process are defined: *Social Innovation*, *Regional Development* e *Universities*. For each axis cited, keywords were defined to perform the searches. For the first axis *Social Innovation*, the

following keywords were used: *Social innovation*; for the second axis, *Regional Development*, *social development* and *regional development*; and, for the third axis *Universities*: *universities* and *higher education*.

The Boolean expression used to search in the databases was ("social innovation") ("social development" or "regional development") AND ("universities" or "higher education"). In the search, articles published in the period between 2000 and 2018 were filtered.

In this first search, carried out according to the aforementioned delimitations, 2815 articles were found to compose the Raw Database of Articles, illustrated in Graph 1. These publications were exported to the Endnote X5 Software so that the analysis could continue.

Graph 1 - Raw Database of Articles



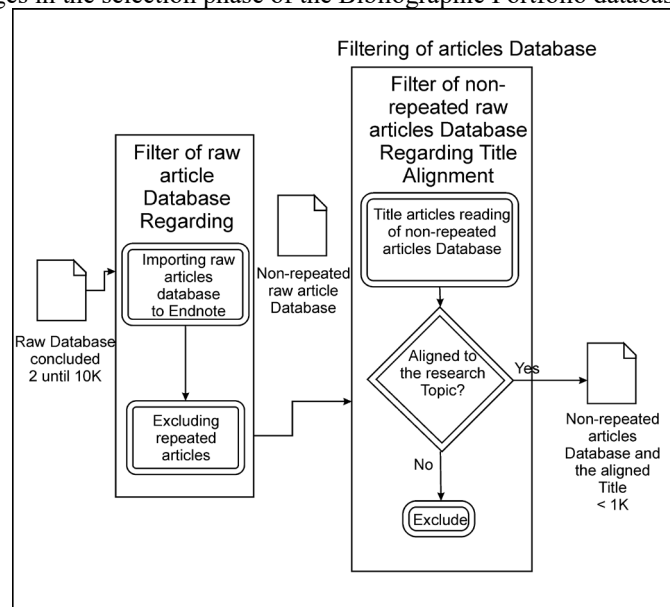
Source: results from the Survey, 2018.

Then, the keyword adherence test was performed, that is, by reading the titles of six articles selected by adherence to the theme, then, it was found that the keywords were aligned with the research theme, and for this reason it was not necessary to incorporate new keywords.

After contribute to the Raw Database of Articles, the process has

continued with the filtering of the duplicated articles or without authors, which resulted in 2741 articles. Then, the titles of the articles were read, considering those that were in line with the research theme. In this process, shown in Figure 3, only 69 articles remained, that is, 2672 works were eliminated.

Figure 3 - Stages in the selection phase of the Bibliographic Portfolio database of raw articles.



Source: Ensslin et al, 2014.



The next step developed refers to the scientific recognition of the selected materials by checking the number of citations that each of the 69 articles had using the Zotero software, which is a reference manager. Thus, representativeness was fixed for a citation, excluding from the portfolio works that had not been measured once. At this stage, 31 articles remained in the Bibliographic Portfolio, selected from the alignment of the title and scientific recognition.

Subsequently, the abstracts of the articles were read, and 7 articles were excluded from the portfolio as they were not adherent to the research theme. At that time, the database of non-repeated articles, with aligned titles and without scientific recognition was retrieved in order to find potential articles to be included in the Bibliographic Portfolio. From this database, there are articles which were published in the last 3 years and, therefore, have not yet had enough time to be cited. With the use of this filter, it was identified that 12 articles could be part of the portfolio. Also, one article was retrieved, which was elaborated by one of the authors who is part of the Bibliographic Portfolio. Of the 13 retrieved articles, abstracts were read and only 1 of them was in line with the research theme.

Thus, 25 articles were read in full, among which 11 articles were selected, which make up the primary database of the Bibliographic Portfolio.

In the last stage of the Bibliographic Portfolio selection, the bibliographic references cited in the articles that make up the primary portfolio were analyzed. For this, the references of the primary articles (11 articles) were listed, using the same delimitations defined in the first stage of the selection, which is restricted to the references published in journals between 2000 and 2018. Likewise, Endnote X5 software was used to manage these publications and Zotero to check the number of citations for each of these works.

In this process, 407 articles were exported from the references of the articles in the primary portfolio. Of these, after analyzing the articles filtered by the title alignment and representativeness test, only 20 articles were submitted to reading the abstracts. Nine articles were selected in which the abstracts were aligned for their full reading. Of the 9 articles, 8 were considered adherent to the study, being incorporated into the prepared Bibliographic Portfolio, represented in the Table below.

Table 3 Selected articles to compose the Bibliographic Portfolio.

	<b>Authors</b>	<b>Title</b>	<b>Year</b>	<b>No. of citations</b>
<b>1</b>	A. Bramwell and D. A. Wolfe	Universities and regional economic development: The entrepreneurial University of Waterloo	2008	490
<b>2</b>	P. Chatterton and J. Goddard	The response of higher education institutions to regional needs	2000	393
<b>3</b>	J. Drucker and H. Goldstein	Assessing the regional economic development impacts of universities: A review of current approaches	2007	330
<b>4</b>	G. Boucher, C. Conway and E. Van Der Meer	Tiers of engagement by universities in their region's development	2003	323
<b>5</b>	D. Charles	Universities as key knowledge infrastructures in regional innovation systems	2006	176
<b>6</b>	E. Uyarra	Conceptualizing the regional roles of universities, implications and contradictions	2010	165
<b>7</b>	M. Harloe and B. Perry	Universities, Localities and Regional Development: The Emergence of the 'Mode 2' University?	2004	141
<b>8</b>	R. Huggins and A. Johnston	The economic and innovation contribution of universities: A regional perspective	2009	118
<b>9</b>	J. Goddard and J. Puukka	The engagement of higher education institutions in regional development: An overview of the opportunities and challenges	2008	106

10	H. A. Goldstein and K.	Research universities as actors in the governance of local and regional development	2012	36
11	M. Tripl, T. Sinozic and H. Lawton Smith	The Role of Universities in Regional Development: Conceptual Models and Policy Institutions in the UK, Sweden and Austria	2015	35
12	J. Karlsen	When regional development becomes an institutional responsibility for universities: The need for a discussion about knowledge construction in relation to universities' third role	2005	15
13	J. Tomaney and F. Wray	The University and the Region: An Australian Perspective	2011	12
14	V. Peer and M. Penker	Higher Education Institutions and Regional Development: A Meta-analysis	2016	9
15	A. Bonaccorsi	Addressing the disenchantment: universities and regional development in peripheral regions	2017	8
16	X. F. Wang and P. Vallance	The engagement of higher education in regional development in China	2015	3
17	J. Harrison and I. Turok	Universities, knowledge and regional development	2017	3
18	S. N. Fongwa and G. Wangenge-Ouma	University as regional development agent: a counterfactual analysis of an African university	2015	3
19	N. S. Fongwa and L. Marais	University, Knowledge and Regional Development: Factors Affecting Knowledge Transfer in a Developing Region	2016	1

Source: Data from the survey (2018)

## 4.2 Bibliometric Analysis

After the identification of the articles that make up the Bibliographic Portfolio, a bibliometric analysis was carried out, aiming to evaluate information from the articles (AFONSO *et al.*, 2011), as well as to quantitatively evidence statistical data aiming at the management of information and scientific knowledge of the researched topic, which is done through document counting.

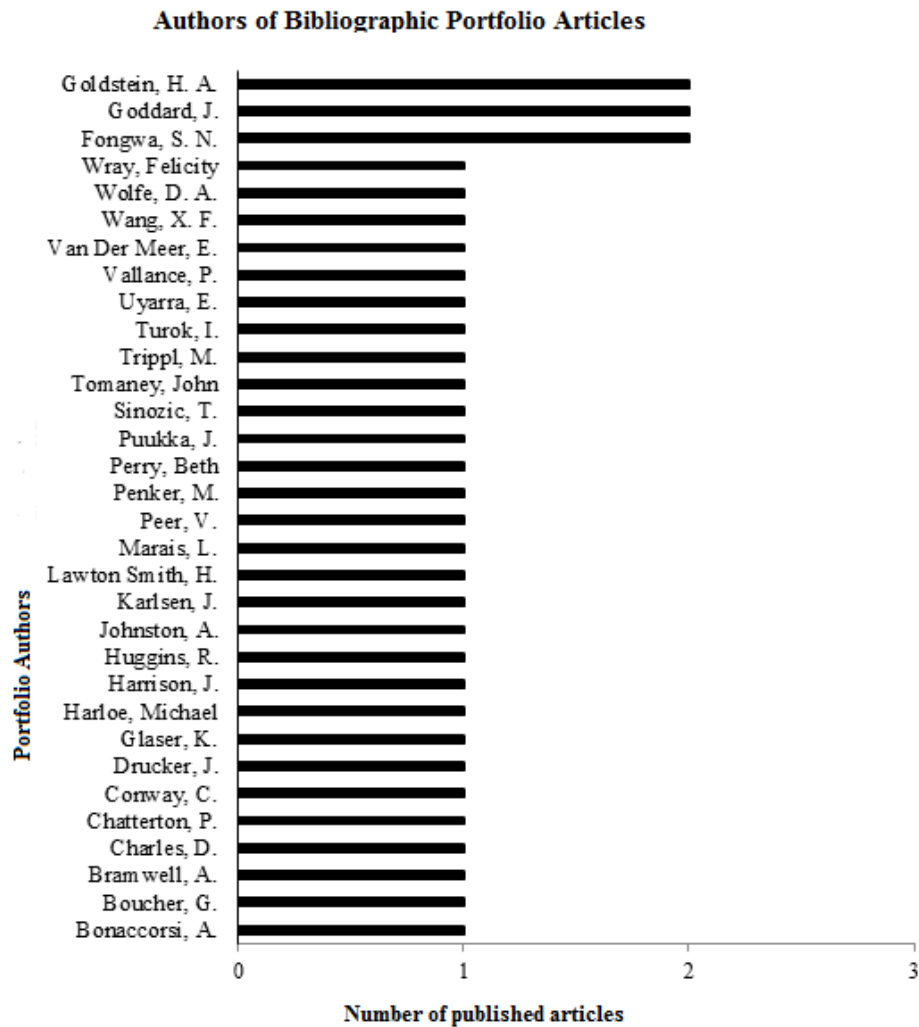
The data used in bibliometry comes from the 19 articles of the Bibliographic Portfolio and respective references, selected in the previous stage of the structured process.

### 4.2.1 Found Results

Six variables were considered in the bibliometric analysis: (i) Authors of the articles in the Bibliographic Portfolio and References; (ii) Highlight Articles from the Bibliographic Portfolio and References; (iii) Highlight Journals; (iv) Impact Factor of journals in Journal Citation Reports (JCR); (v) Impact factor of journals in Scimago Journal Rank (SJR); (vi) Highlight Keywords.

In the first variable analyzed, Authors of the articles in the Bibliographic Portfolio and References, the number of occurrences of the 33 authors who made up the Bibliographic Portfolio was identified. A. H. Goldstein, J. Goddard and N. S. Fongwa are considered highlights the portfolio for contributing with 2 written articles, see Graph 2.

Graph 2 - Articles' Authors in the Bibliographic Portfolio.

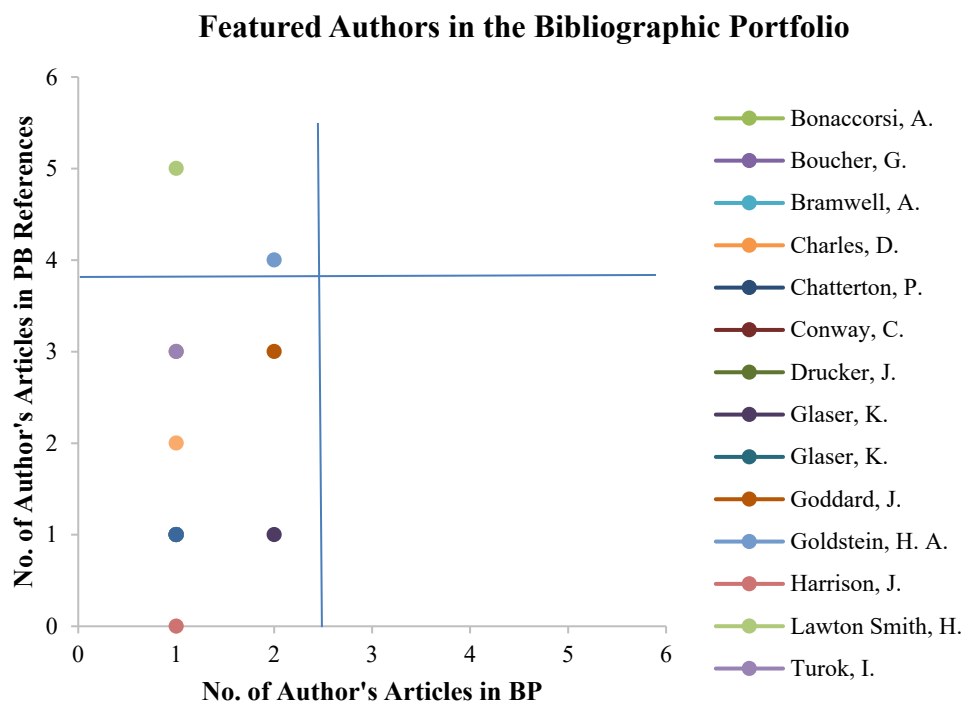


Source: Data from the survey (2018)

As for the authors featured in the article references, 229 researchers were identified who, in some way, contribute to the scientific community. Among these, stands out H. L. Smith, who appeared in 5 works in the references. Another highlight in this regard is H. A. Goldstein, with 4 works in the references.

Subsequently, the authors of the Bibliographic Portfolio were crossed with the authors of the Portfolio references, making it possible to identify the authors who developed the works that conceived the Bibliographic Portfolio, as well as those used as a reference for the elaboration of such productions.

Graph 3 Featured Authors in the Final Portfolio.



Source: Data from the survey (2018)

In the analysis of the references, it was found that the authors (see Graph 3) were cited by other authors in the Bibliographic Portfolio. Helen Lawton Smith stands out as the most cited author in the references of the Bibliographic Portfolio.

Helen Lawton Smith has a degree in Economics from the University of London and a professor of geography from the University of Oxford. She served as Director of Birkbeck Center for Innovation Management Research, Birkbeck, University of London. Her research career has focused on the relationship between entrepreneurship, innovation, public policies and regional development in national and international contexts. Founder and Research Director of the Oxfordshire Economic Observatory, Department of Geography, at the University of Oxford, an independent research center that contributes to the formulation of evidence-based policies. She is a visiting professor at the University of Sussex and at the University of Halmstad (Sweden). She published 10 books, 65 journal articles in international

magazines and more than 30 book chapters. A particular focus of the author is the impact of higher education on economic development and government. Her book, *Universities, Innovation and the Routledge Economy* (2006) dealt with the issue of involving universities with broader communities, particularly through labor markets for the highly qualified.

In second place is Harvey Goldstein, bachelor in Accounting and Ph.D. in City and Regional Planning. He is a British statistician known for his contributions to multilevel modeling methodology and software, and for applying it to educational evaluations and leaderboards. Harvey Goldstein joined MODUL University - Vienna in August 2008 as Professor and Director of the Governance and Public Management Program. From 1977 to 2005, he was a professor of statistical methods at the University of London Institute of Education. He was elected a Fellow of the British Academy in 1996 and received the Guy Medal in silver by the Royal Statistical Society in 1998. The professor spent the previous 26 years in the USA on the faculty

of the University of North Carolina at Chapel Hill, Department of Urban and Regional Planning, where he directed the Ph.D. program for 15 years. He also served on Columbia University faculty, and as a visiting professor in the 1980s and a senior Fulbright fellow in 2000 at Vienna University of Economics and Business Administration. Professor Goldstein's main research and teaching interests include planning and managing regional and local economic development, the role of knowledge-based institutions in the governance and development of regions, research and evaluation methods and research design. He also did extensive work in the area of regional labor market analysis and economic forecasting. He served as a consultant to the United Nations Development Program, the International Labor Agency of the US Bureau of Labor Statistics, the World Bank, the US Agency

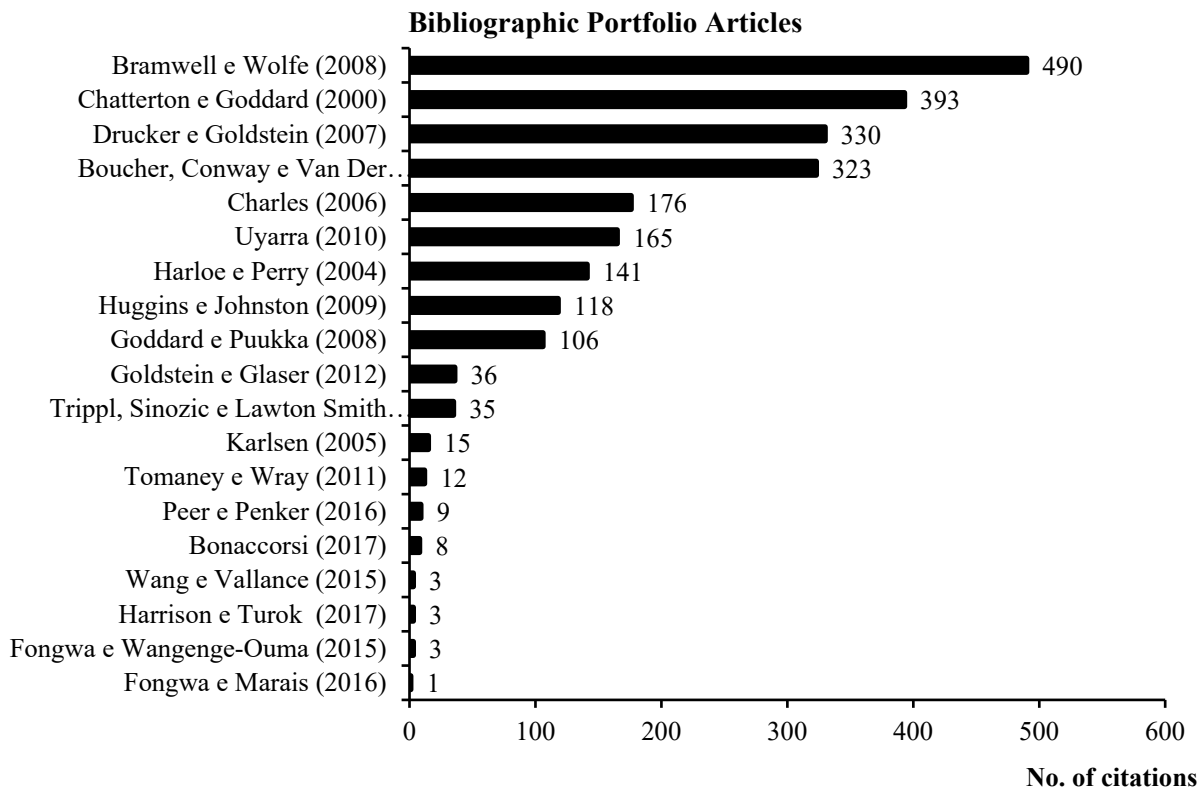
for International Development and various state and local government organizations in the USA. Goldstein contributed 2 articles from the portfolio and was cited 4 times in the references of those articles.

It appears that both prominent authors have lines of research consolidated in studies on universities and regional development and have in their curricula publications that emphasize the area of study.

Another fact to be considered is that the authors and their respective articles have an expressive number of citations, verified through Google Scholar, on May 9, 2018.

Graph 4 shows the result of the Highlighted Articles of the Bibliographic Portfolio and the References, taking into account their scientific recognition. For this, the number of articles' citations in the Bibliographic Portfolio and respective References was considered.

Graph4 Featured Articles from the Bibliographic Portfolio.

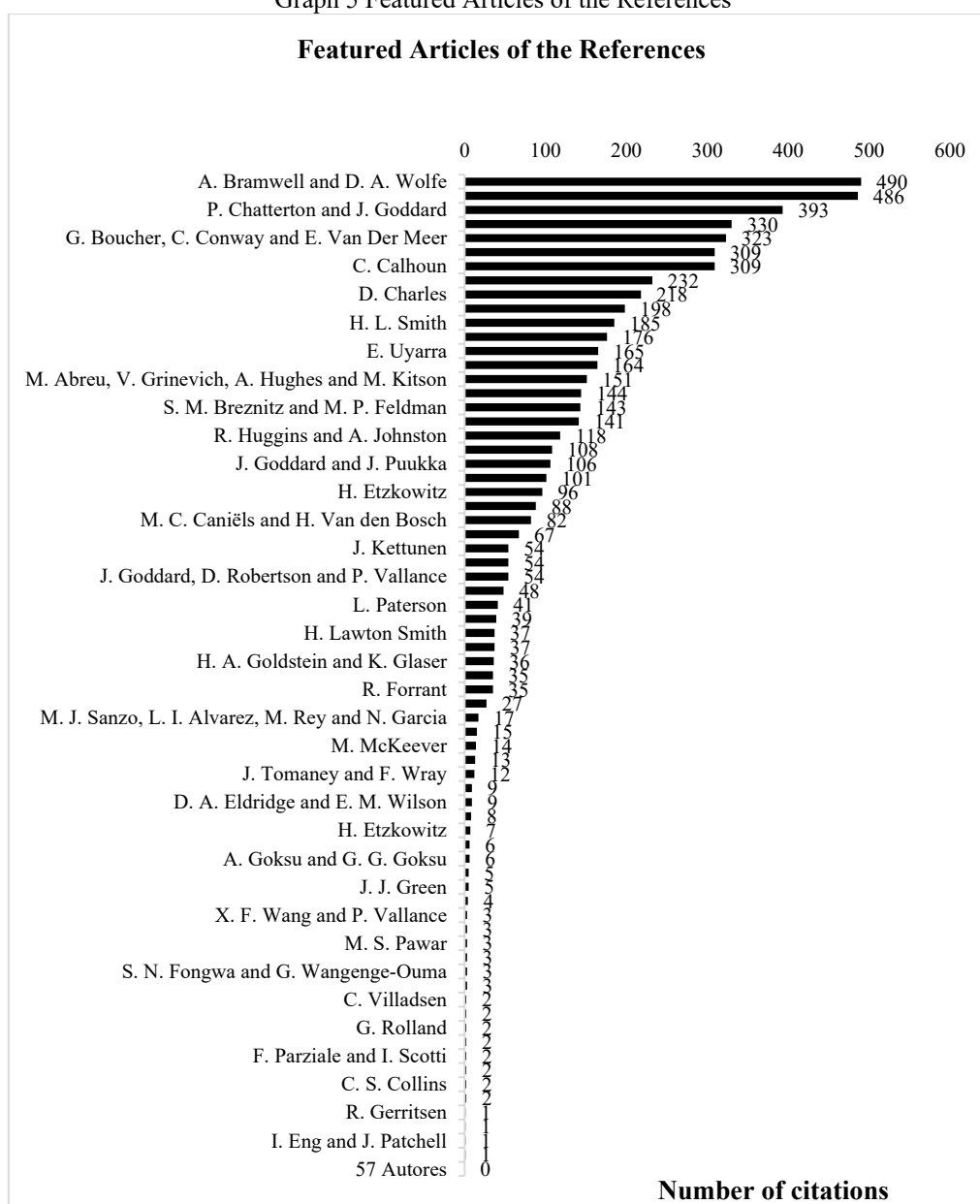


Source: Data from the survey (2018)

Regarding the articles in the Bibliographic Portfolio, the work with the highest number of citations was developed by the authors Bramwell and Wolfe (2008), entitled *Universities and regional economic development: The entrepreneurial University of Waterloo*. This article has been cited 490 times, according to *ZOTERO software*. It is important to consider the publication date of the article, given that the most recent articles may not have citations even though they are of great relevance to the topic under study.

Regarding the articles in the References of the Bibliographic Portfolio, the most prominent article is *Universities and regional economic development: The Entrepreneurial University of Waterloo*, by A. Bramwell and D. A. Wolfe (2008), which has 490 citations. Secondly appears the article *University spillovers and new firm location* by D. B. Audretsch, E. E. Lehmann and S. Warning, with 486 citations (see Graph 5). It should be noted that the prominent article in the references of the Bibliographic Portfolio had been incorporated into the set of works relevant to the research development.

Graph 5 Featured Articles of the References

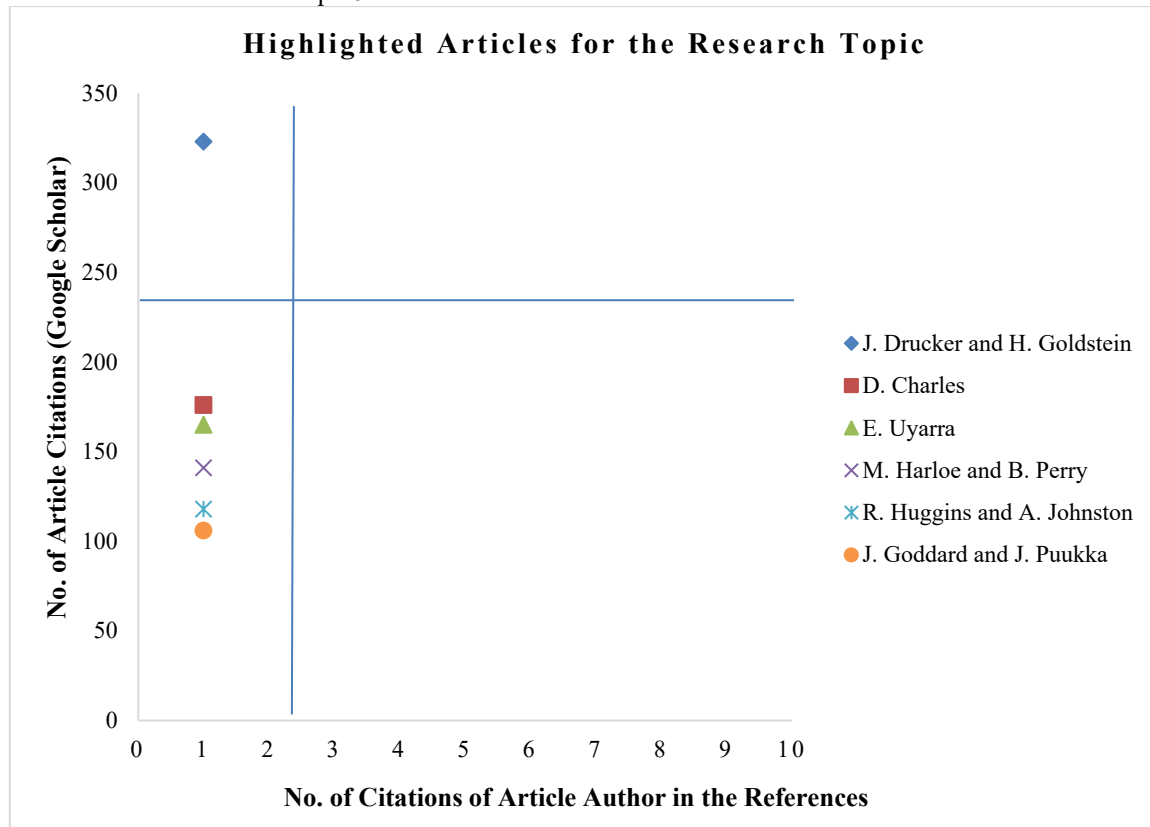


Source: Data from the survey (2018)

When crossing the information referring to the number of citations of the article (Google Scholar) with the number of the authors' citations in the references of these articles, it is noticed that the article *Assessing the regional economic development impacts of universities: A*

*review of current approaches*, published by Goldstein and H. J. Drucker, appeared as the most prominent work. The article had been used by authors of the Bibliographic Portfolio, who clearly show in their writings the importance of the author Harvey Goldstein for the research area.

Graph 6 Featured Articles in the Portfolio and References



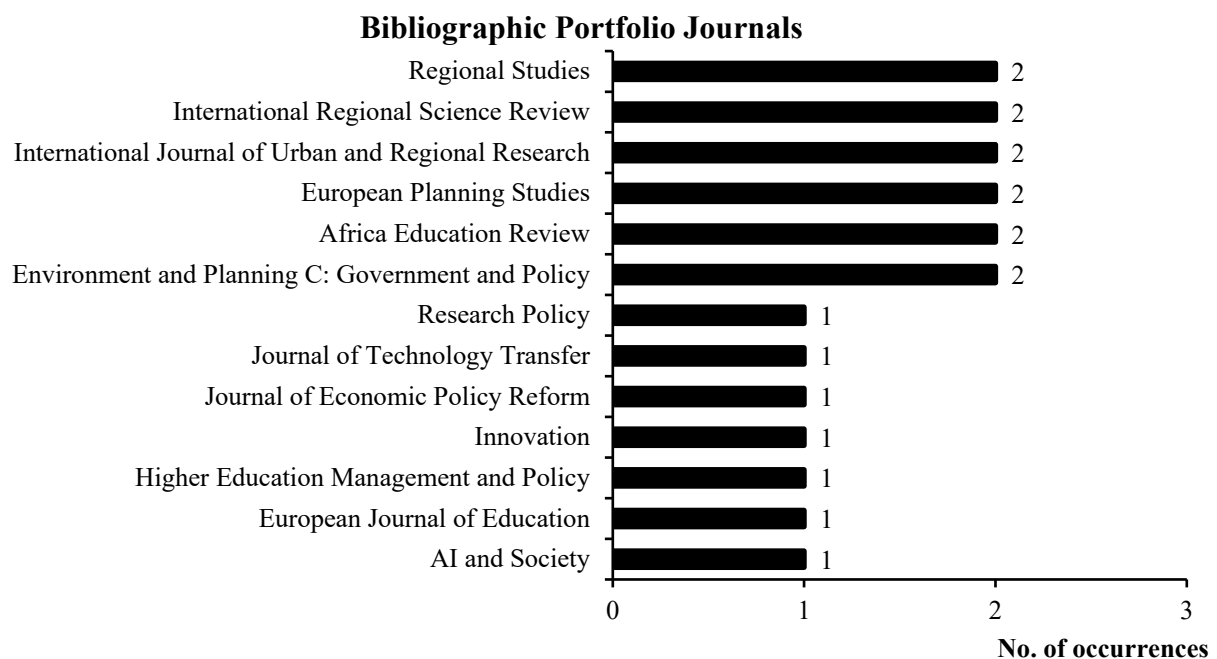
Source: Data from the survey (2018)

Among the 19 selected publications, as Graph 6, the Featured Journals are presented. It is worth noting that, of the 13 journals in the Bibliographic Portfolio, no journal has obtained evidence, which allows us to conceive the idea that the subject is of interest to several journals that bring studies related to the theme.

Of the 92 journals cited in the References of the Bibliographic Portfolio,

the international journal *Procedia- Social and Behavioral Sciences* stood out for presenting 6 publications. However, this journal is not present in the bibliographic Portfolio; followed by the journals *Environment and Planning C: Government and Policy* and *Journal of Technology Transfer*, both with 3 publications.

Graph 7 Highlighted Journals in the Bibliographic Portfolio



Source: Data from the survey (2018)

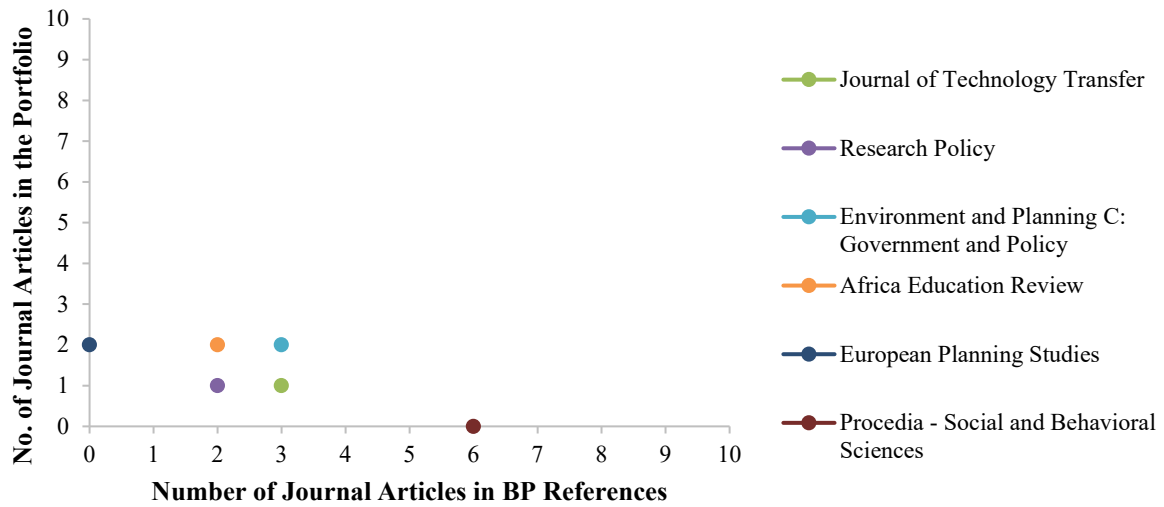
In an attempt to identify journals open to the research dissemination on the subject, the results of journals in the Bibliographic Portfolio and their References were crossed (Graph 8). The journal *Environment and Planning C: Government and Policy*, stood out in number of most cited articles, both in the Bibliographic Portfolio, as well as in the References of these articles. The aforementioned international journal publishes interdisciplinary studies aimed at promoting academic debates on contemporary politics, addressing aspects of economics, society and the environment.

It is committed to a wide range of political issues, not just those related to government and public policies. It had many innovative articles about non-state agents, public-private collaboration and NGOs (Non-Governmental Organizations). All areas of economic, social and environmental and political institutions are included, as reflected in the Editorial Board. The disciplines from which the articles derive are broad and include Political Science, Planning, Geography, Economics, Law, Sociology and Public Administration.



Graph 8 Prominent Journals in the Portfolio and References

**Prominent Journals in the Portfolio and References**



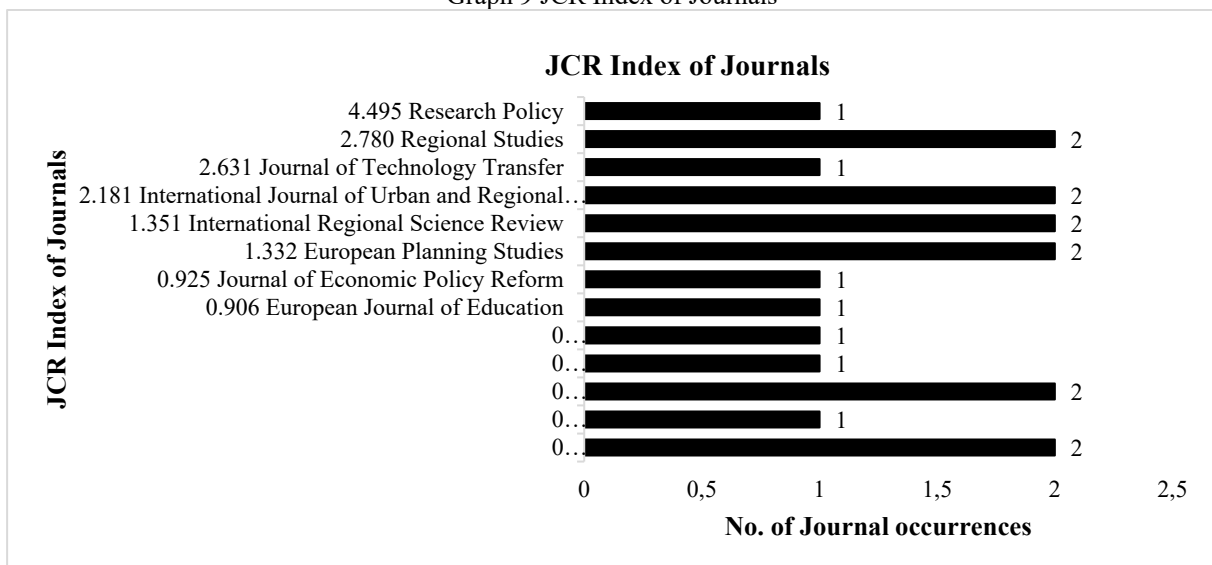
Source: Data from the survey (2018)

After the Highlight Journals analysis of the Bibliographic Portfolio, their impact factor in the scientific community had been considered. These indicators depict the average number of citations for articles published by journals over two years. In the case of this research, the journals that published the articles of the Bibliographic Portfolio were consulted regarding their impact factors in

IsiKnowledge databases from Isi - Web of Science, called Journal Citation Reports (JCR) and the impact factor used by Scopus database, which measures the relevance of scientific production by journal or country, called Scimago Journal Rank (SJR).

For *IsiKnowledge database*, of 13 journals, *Research Policy* journal stood out with 4,495 index (see Graph 8). Five journals do not have a JCR impact factor.

Graph 9 JCR Index of Journals



Source: Data from the survey (2018)

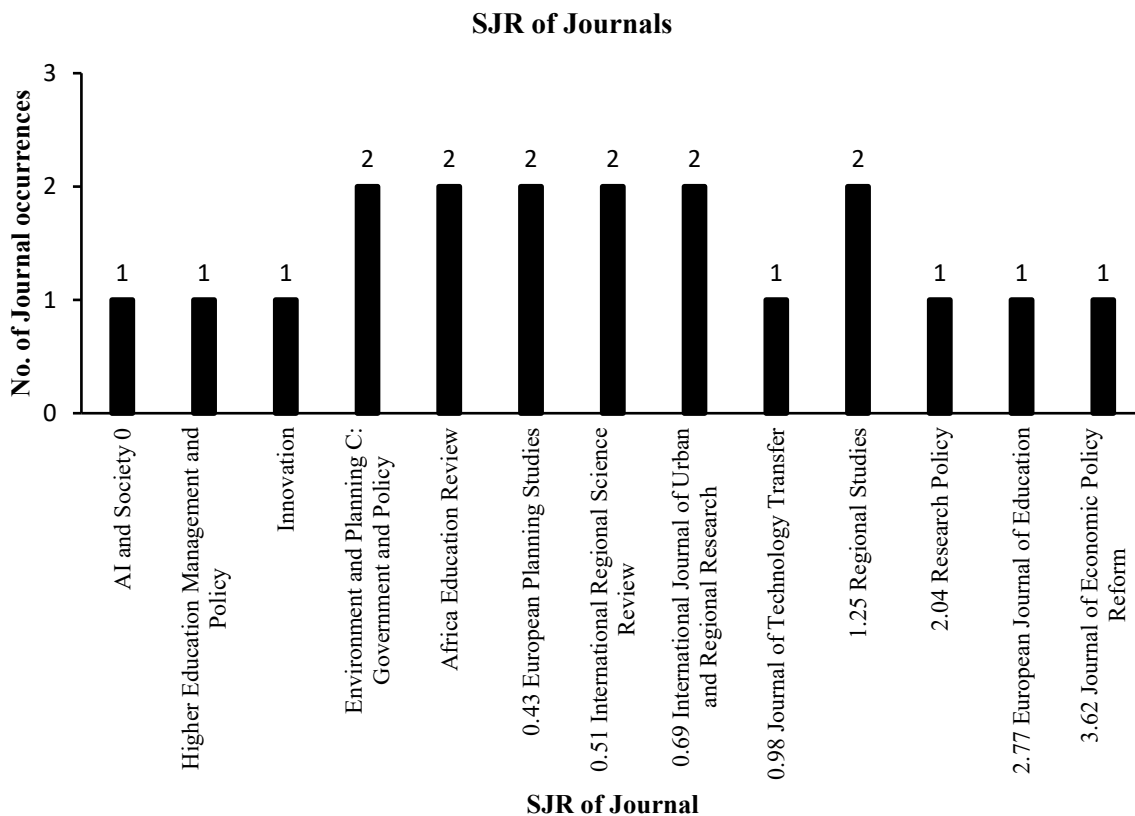
In relation to the SJR (Graph 10), the journal with the most prominence is the Journal of Economic Policy Reform, with an index of 3.62, being that 5 journals did not present the mentioned impact factor. It is also clear that the journals Regional Studies and Research Policy are featured in JCR and SJR indexes.

The *Journal Regional Studies* is a leading international magazine in theoretical development and empirical analysis and political debate in the field of multi and interdisciplinary regional studies. The magazine invites established and future academics to present works focusing on economic, environmental, political and social change aspects of regional (subnational) development and policy formulation. *Regional Studies* is a central forum to discuss the latest results of

research on regional development and formulation of policies from an interdisciplinary perspective.

*Research Policy* is a multidisciplinary journal dedicated to analyzing, understanding and effectively responding to the challenges of economic, political, managerial, organizational, environmental and other represented by innovation and science. This includes various activities related to the creation of knowledge (through research), the dissemination and acquisition of knowledge (for example, through organizational learning) and its exploitation in the form of products, processes or services. It is recognized as the leading journal in the field of innovation studies, reflected in a notably high impact factor for a social science journal.

Graph 10 Journals SJR Index.

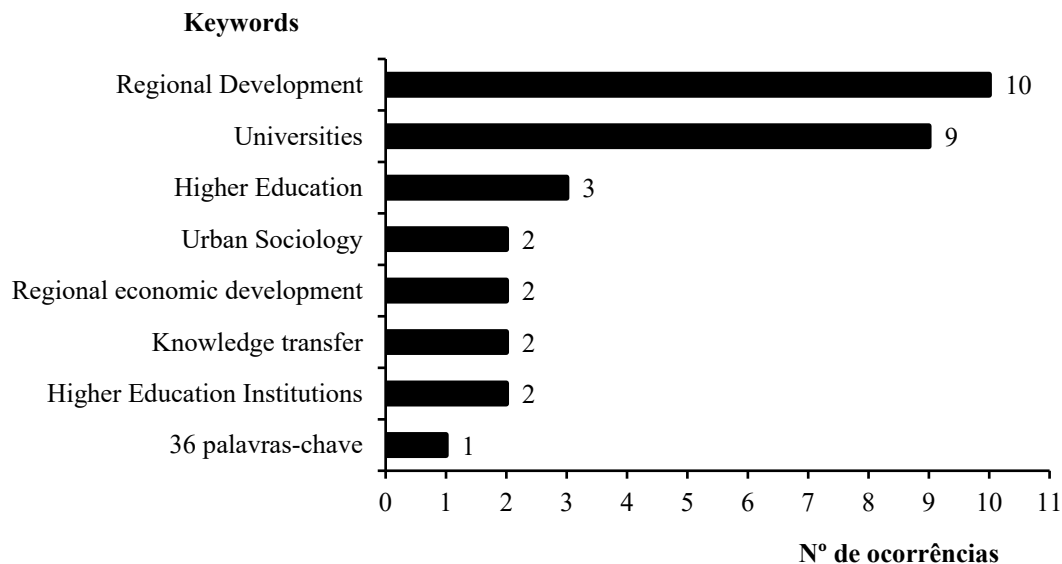


Source: Data from the survey (2018)

Another point to be researched, and the last of this study is the most used set of keywords in the articles of Bibliographic

Portfolio. A total of 44 keywords were identified, as shown in Graph 11.

Graph 11 Most found Keywords in the Bibliographic Portfolio.



Source: Data from the survey (2018)

The defined keywords based on the axes of this research are among the 13 most cited in the Bibliographic Portfolio. This fact corroborates the adherence of words in relation to the research theme, used to start the search process for this study.

As for the most used keywords in the research, Regional Development, Universities and Higher Education are the ones that are more repeated.

## 5 FINAL CONSIDERATIONS

The main objective of this work was to map the theme 'The university role in regional development'. For that, it was necessary:

- (i) Select a set of articles to compose a Bibliographic Portfolio of proposed theme; and
- (ii) Identify the Bibliographic Portfolio highlights for the variables: articles, authors and keywords;

To meet the specific objective (i), the research made use of a structured process that, in the development of subsection 4.1, made it possible to make the selection of a theoretical framework, which started with 2,815 articles that comprised the raw database of articles. To reach the Bibliographic Portfolio of 19 selected articles, keywords were defined in three research axes; five international databases were selected; as well as, the filtering of database articles, which consisted in the alignment of articles regarding the title, expected number of citations and abstract alignment. Finally, there was a complete reading of the articles, which culminated in the selection of productions adhering to the theme.

After defining the Bibliographic Portfolio, bibliometric analysis was performed, a tool for understanding and analyzing the informational context of the research area, which made it possible to visualize the characteristics of scientific production on the subject. Thus, the specific

objective (ii) was contemplated in subsection 4.2, along which the results presented in the sequence were achieved.

With regard to the most recurrent authors in the set of articles analyzed, A. H. Goldstein, J. Goddard and N. S. Fongwa are considered outstanding in the portfolio for contributing with 2 written articles. In the Bibliographic Portfolio articles, H. L. Smith, with 5 works, and H. A. Goldstein, with 4 works, stood out in the references.

Regarding the articles in the Bibliographic Portfolio, the work with the highest number of citations was prepared by the authors Bramwell and Wolfe (2008), with 490 citations, entitled *Universities and regional economic development: The entrepreneurial University of Waterloo*. Regarding the articles in the bibliographic portfolio references, the most prominent articles are *Universities and regional economic development: The entrepreneurial University of Waterloo*, by A. Bramwell and D. A. Wolfe (2008), which has 490 citations and the article *University spillovers and new firm location* by the authors D. B. Audretsch, E. E. Lehmann and S. Warning, with 496 citations. When crossing the information referring to the number of article citations (Google Scholar) with the author citation number in the references of these articles, it is clear that the highlight goes to the work published by J. Drucker and H. Goldstein, *Assessing the regional economic development impacts of universities: A review of current approaches*.

The journal *Environment and Planning C: Government and Policy*, stood out, both in the Bibliographic Portfolio, as well as in the References of these articles.

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However, the journal with the highest JCR impact factor was Research Policy, with an index of 4,495 and the journal with the highest SJR impact factor was Journal of Economic Policy Reform, with an index of 3.62.

As for the most used keywords in the research, Regional Development, Universities and Higher Education are the most frequent. It is worth mentioning that they were used in the research axes, defined by the author.

Thus, it appears that it was possible to meet the objectives outlined in the research. In addition, it was found that the methodology applied through ProKnow-C enabled the identification of scientific production in line with the study theme "University and Regional Development". Thus, the study relevance is in Proknow-C method illustration, capable of contributing to researchers from different areas in the bibliographic portfolio selection and bibliometric analysis.

It is important to consider that the obtained results are limited to the sample of researched journals and the keywords used by the authors, as well as, the informed filters used during the formation process of this Bibliographic Portfolio.

Finally, it is suggested, for future work, the advance of this research to other databases, including national databases. In addition, a content analysis for the Bibliographic Portfolio presented in this research is recommended according to established categories. Thus, it will be possible to understand the content covered by the research presented.

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