



Revista de Administração de Empresas

ISSN: 0034-7590

ISSN: 2178-938X

Fundação Getúlio Vargas, Escola de Administração de
Empresas de S.Paulo

MARTINS, BIBIANA VOLKMER; FACCIN, KADÍGIA; MOTTA, GUSTAVO
DA SILVA; BERNARDES, ROBERTO; BALESTRIN, ALSONES
EVOLUÇÃO E TENDÊNCIAS DA AGENDA DE PESQUISA INTERNACIONAL EM INOVAÇÃO
Revista de Administração de Empresas, vol. 59, núm. 4, 2019, Julho-Agosto, pp. 293-307
Fundação Getúlio Vargas, Escola de Administração de Empresas de S.Paulo

DOI: 10.1590/S0034-759020190407

Disponível em: <http://www.redalyc.org/articulo.oa?id=155161289007>

- Como citar este artigo
- Número completo
- Mais informações do artigo
- Site da revista em redalyc.org

UAEM redalyc.org

Sistema de Informação Científica Redalyc
Rede de Revistas Científicas da América Latina e do Caribe, Espanha e Portugal
Sem fins lucrativos acadêmica projeto, desenvolvido no âmbito da iniciativa
acesso aberto

PERSPECTIVES

Invited article

Translated version

DOI: <http://dx.doi.org/10.1590/S0034-759020190407>

EVOLUTION AND TRENDS OF THE INTERNATIONAL INNOVATION RESEARCH AGENDA

INTRODUCTION

The Strategic Organizational Management area of study has been marked, especially in the last ten years, by a substantial increase in scientific and technological production in innovation research. Such growth can be grouped into at least five thematic axes: a) innovation as a driver of competitiveness of organizations, networks, sectoral activities, and global value chains (Crossan & Apaydin, 2010; Marchi, Giuliani, & Rabellotti, 2018); b) innovation as a driving force of economic, technological, social, and sustainable development of regions and nations (Cirera & Maloney, 2017); c) innovation as a strategic management process for the transformation of resources and capabilities into new products, services, and business models (Adams, Bessant, & Phelps, 2006); d) architecture of institutional ecosystems and actors (university/company/government/society) oriented to acquire value and accelerate innovation (Carayannis, Grigoroudis, Campbell, Meissner, & Stamati, 2018; Etzkowitz & Zhou, 2017); and e) new methodologies, metrics, and advanced technological tools for innovation research (Keupp, Palmié, & Gassmann, 2012).

Since the beginning, from the seminal works of Schumpeter (1931—theory of economic development) to the formation of a classical scientific base and more contemporary contributions, the field of innovation has continuously expanded, internationalizing and incorporating new themes and scientific boundaries that are not always well defined (Rosseto, Bernardes, Borini, & Gattaz, 2018). Many questions arise, especially for less experienced researchers, and even for those more experienced and seeking a broad view of this field of study, such as: What are the leading journals in the field of innovation management; what is their focus of interest and what have they been publishing? What are the most commonly used methodologies and techniques? Who are the most common authors? What are the most researched locations, and what are the funding agencies for this type of research? What are the topics of greatest interest today? What are the emerging themes that signal the future research agenda for scientific production?

To answer these questions, we analyzed articles published in the *Web of Science* (WoS) database from 2000 to 2017 and data from previous bibliometric studies to deepen our understanding of the evolutionary path of topics of interest. Moreover, we investigated the websites of the journals identified as the main journals in the area, analyzing the scope of each and the main calls in special issues of journals (from 2016 to 2019) to understand the current situation regarding the theme and what has emerged, indicating future paths. Finally, we analyzed the calls for the main academic events that deal with the topic to understand the future perspectives of interest in this field of studies, thus offering an overview to scholars who are dedicated to the study of innovation management.

In general, the present article maps the field for researchers pursuing research in this area and offers insights into public policies and institutions that fund research projects. It also offers a guide of publication opportunities to those interested in innovation studies.

BIBIANA VOLKMER MARTINS¹

bibivolkmer@hotmail.com

ORCID: 0000-0003-4259-1366

KADÍGIA FACCIN¹

kadigiaf@unisinis.br

ORCID: 0000-0003-2804-2328

GUSTAVO DA SILVA MOTTA²

gustavosmotta@gmail.com

ORCID: 0000-0003-1393-143X

ROBERTO BERNARDES³

bernardes@fei.edu.br

ORCID: 0000-0002-2065-3223

ALSONES BALESTRIN¹

abalestrin@unisinis.br

ORCID: 0000-0001-6397-1582

¹Universidade do Vale do Rio dos Sinos, Escola de Gestão e Negócios, Porto Alegre, RS, Brazil

²Universidade Federal Fluminense, Volta Redonda, RJ, Brazil

³Centro Universitário da Fundação Educacional Inaciana Padre Sabóia de Medeiros, São Paulo, SP, Brazil

WHAT ARE THE MAIN JOURNALS IN THE AREA OF INNOVATION MANAGEMENT?

It seemed essential to begin by identifying the leading journals worldwide that deal with innovation in areas related to management. Although some terms such as research policy, technovation, and R&D management arise when we think of journals relevant to this research field, we needed a more comprehensive list of journal options, so why not prepare a list of the “top ten,” for example? We then searched WoS to find journals that represent the state of the art in innovation. WoS was chosen because it is the main global scientific database (Motta, Garcia, & Quintella, 2015).

Thus, we identified the 25 journals that published the largest number of articles containing the term “innovation” (in the title, abstract, or keywords) with at least one-third of their publications containing the word, as we were seeking specialized journals in the area of innovation. Besides being considered specialized in innovation, and prioritizing the quality of publications, the journal should have a high impact factor, also known as JCR (Journal Citation Reports). Table 1 presents these data. The first 11 journals are those that meet the criteria to be classified as specialized in innovation (>33% containing the term innovation) and that have a high impact (JCR>1).

Table 1. Journals specialized in innovation

Source	Articles containing the term innovation	JCR	Total number of articles	% of articles containing the term innovation
Research Policy	1741	4.495	2697	65%
Journal of Product Innovation Management	772	3.759	1197	64%
Technovation	953	3.265	1781	54%
Journal of Technology Transfer	314	2.631	480	65%
Technological Forecasting and Social Change	1177	2.625	3550	33%
R & D Management	572	2.444	1258	45%
Research-Technology Management	354	2.429	1046	34%
Journal of Engineering and Technology Management	260	2.419	402	65%
Industrial and Corporate Change	345	1.777	696	50%
Technology Analysis & Strategic Management	682	1.273	1027	66%
International Journal of Technology Management	902	1.036	1883	48%
Strategic Management Journal	441	4.461	2174	20%
Journal of Business Research	629	3.354	5046	12%
Harvard Business Review	250	3.227	5218	5%
Industrial Marketing Management	444	3.166	2685	17%
Management Science	367	2.822	5726	6%
Regional Studies	422	2.78	2739	15%
Organization Science	352	2.691	1403	25%
Small Business Economics	378	2.421	1488	25%
Management Decision	266	1.396	1223	22%
Transactions on Engineering Management	332	1.188	1609	21%
Service Industries Journal	258	1.172	1529	17%
Innovation-Management Policy & Practice	261	0.95	295	88%
Journal of Evolutionary Economics	272	0.862	644	42%
Industry and Innovation	269	0.791	309	87%

After completing the list of the Top 11, we searched for data that could help answer the questions posed in the introduction. Accordingly, we examined websites of the 11 journals and extracted their articles from the WoS database (from 2000 to 2017). A total of 10,990 articles were extracted in text file format (.txt). The file comprised all the content and references in these articles. These data were cleaned and standardized using the VantagePoint 9.0 software.

What is the focus of interest of the top journals?

We checked the scope in the editorial description of each journal to identify which topics they declare as being of interest. We noted that some journals are more generalist and cover several areas and topics while others are more specific, restricting their interest to the area of management and three or four topics or specific sectors. Journals 1, 3, and 9 presented in Exhibit 1 declare

themselves to be interdisciplinary and address broad topics of innovation, not only in the organizational context but also in the context of social and national policies or knowledge transfer between countries, as is the case of *Technovation*. Of these three, *Industrial and Corporate Change* is the only one that mentions explicitly which other areas besides management they receive articles on, namely, economics, history, political science, and sociology.

Exhibit 1. Main areas of interest of each journal, according to its scope

No	Journal	Main interests
1	<i>Research Policy</i>	Innovation, technological change, R&D, science and research, and knowledge management.
2	<i>Journal of Product Innovation Management</i>	Innovation management and product development, organizations of all sizes, consumers, business-to-business, and policy.
3	<i>Technovation</i>	Innovation considered from process and product perspectives. It deals with technological innovation in business, political and economic systems; social innovations (regulation and policy as well as the creation of non-economic benefit); and technology transfer to and between developing countries.
4	<i>Journal of Technology Transfer</i>	It emphasizes research on management practices and strategies for technology transfer, in addition to exploring the external environment that affects such practices.
5	<i>Technological Forecasting and Social Change</i>	It deals specifically with the methodology and practice of technological forecasting and future studies as planning tools since they relate to social, environmental, and technological factors.
6	<i>R & D Management</i>	It covers the full range of topics in research, development, design and innovation, and strategic issues related to human resources (from exploratory science to commercial exploitation). It also accepts articles that investigate social, economic, and environmental implications. Moreover, the journal publishes notes and comments and reviews new publications in the field.
7	<i>Research-Technology Management</i>	It focuses on the practice of innovation with a wide range of topics in innovation and technology management.
8	<i>Journal of Engineering and Technology Management</i>	Links engineering, science, and business administration disciplines. Issues involved in the planning, development, and implementation of technological resources to shape and achieve the strategic and operational objectives of an organization; the most diverse aspects of technology, innovation, and engineering management.
9	<i>Industrial and Corporate Change</i>	Focus on presenting and interpreting organizations and corporate changes, innovation, industrial and dynamic structures, from several disciplines including economics, management, history, political science, and sociology.
10	<i>Technology Analysis & Strategic Management</i>	Focus on linking the analysis of science, technology, and innovation with the strategic needs of policymakers and management. It covers innovation and technological issues at the corporate and organizational level, to state, national, and international capabilities of global policy issues related to technology.
11	<i>International Journal of Technology Management</i>	It links technology management with engineering, science, and technology management. It seeks to establish channels of communication between government departments, CIOs in industry, commerce, and related businesses and academic experts in the field. It has a great variety of topics in the area of innovation.

Journals 6 and 10 have a broad range of interests, covering issues linked to innovation in organizations, but also to the social, economic, and environmental implications of innovation, such as R&D. The *Technology Analysis & Strategic* journal, besides having a broad range of interests, is unique in that it accepts articles that link theories with the practices of policy makers and managers; the articles are classified as applied research directed to the technological practice or production.

Journals 4, 5, and 7 are specifically interested in articles that emphasize management practices in innovation. The *Technological Forecasting and Social Change* journal is interested in, besides the practices, predictive methodologies in the field of innovation. Finally, journals 8 and 11, focus more on engineering and seek to link issues of innovation management with management in engineering, being

concerned with both operational and the most strategic aspects.

Despite stating that they have a general scope, some themes are more prominent in these journals, which we will present in the next section.

What are the most published research topics in the journals?

Once we analyzed the interests of these journals, we checked whether they publish articles that deal with what they define in their scope. Table 2 shows the number of articles analyzed in each journal, the five most common keywords, and how many articles they appear in.

Table 2. Most common keywords per journal

Journal	No. of articles analyzed	Keywords	Number of articles in which it appears
Research Policy	1,938	<i>R&D</i>	336
		<i>Innovation</i>	320
		<i>Patent</i>	268
		<i>Technology</i>	255
		<i>Entrepreneurship</i>	123
Journal of Product Innovation Management	821	Does not use keywords	
Technovation	1,158	<i>Technology</i>	180
		<i>Innovation</i>	177
		<i>R&D</i>	115
		<i>Entrepreneurship</i>	77
		<i>Patent</i>	62
Journal of Technology Transfer	475	<i>Technology transfer</i>	130
		<i>Entrepreneurship</i>	106
		<i>Innovation</i>	68
		<i>Patent</i>	67
		<i>R&D</i>	64
Technological Forecasting and Social Change	2,196	<i>Technology</i>	307
		<i>Innovation</i>	146
		<i>Patent</i>	142
		<i>R&D</i>	102
		<i>Foresight</i>	79

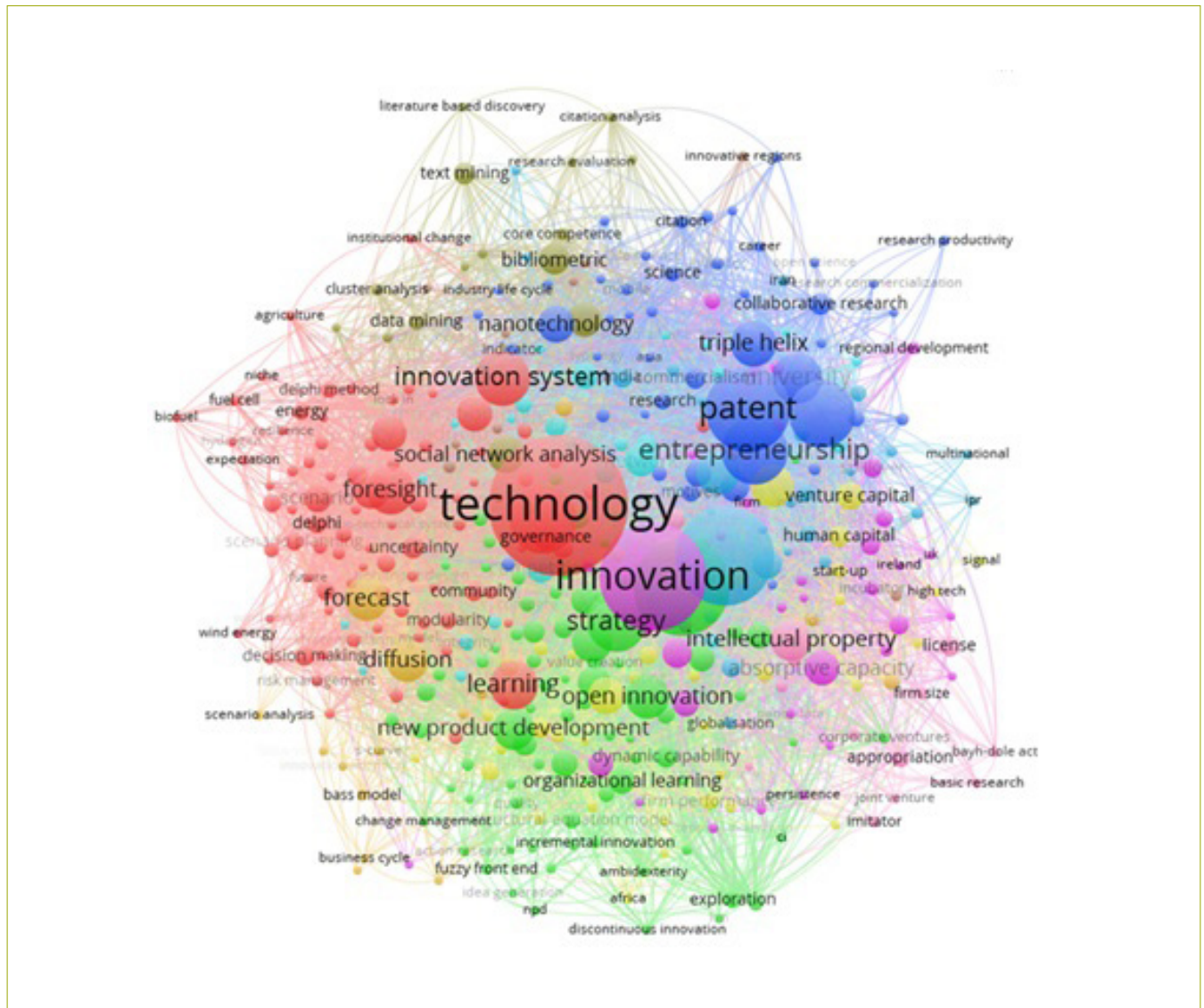
(continue)

Table 2. Most common keywords per journal

(continuation)

Journal	No. of articles analyzed	Keywords	Number of articles in which it appears
R & D Management	647	Does not use keywords	
Research-Technology Management	547	<i>R&D</i>	51
		<i>Open innovation</i>	33
		<i>Technology</i>	28
		<i>Innovation</i>	21
		<i>New product development</i>	20
Journal of Engineering and Technology Management	325	<i>Technology</i>	52
		<i>Innovation</i>	39
		<i>R&D</i>	28
		<i>New product development</i>	20
		<i>Patent</i>	14
Industrial and Corporate Change	705	<i>Innovation process</i>	21
		<i>Technological change</i>	21
		<i>Technological innovation management</i>	21
		<i>Performance</i>	20
		<i>Innovation</i>	14
Technology Analysis & Strategic Management	863	<i>Technology</i>	115
		<i>Innovation</i>	72
		<i>R&D</i>	47
		<i>Patent</i>	47
		<i>Biotechnology</i>	27
International Journal of Technology Management	1,305	<i>Technology</i>	226
		<i>Innovation</i>	187
		<i>R&D</i>	136
		<i>Knowledge management</i>	83
		<i>China</i>	57

Figure 1. Most common keywords in all journals



interrelationships. To facilitate the visualization of the main themes of interest of the top journals, we divided the seven emerging clusters (represented by different colors) into three groups according to the links found in the emerging word networks. The three main topics of interest of these journals are based on the studies of technology & foresight; entrepreneurship, collaboration, and territory; and strategy and development of new products, as shown in Table 4.

Exhibit 2. Large areas of interest addressed by the top journals

Theme	Focus	Examples of associated keywords
1 Technology & Foresight	It is concentrated in the red and camouflage-green clusters. It is associated with the vision of the future—strategic foresight, development of new technologies, and the management of risks and uncertainties associated with this process.	Technology; Foresight; Uncertainty; Future; Decision-making; Risk management; Institutional change; Data mining; Text mining; Modularity; Agriculture; Biofuels; Wind energy; Agriculture.
2 Entrepreneurship, Collaboration, and Territory	It is concentrated in the ultramarine blue and light blue clusters. It is associated with the entrepreneurial actions developed by the different actors of the innovation system and their interdependence for the promotion of innovation.	Triple helix; Patents; Entrepreneurship; Collaborative research; Product life cycle; Innovative regions; Technology transfer; Public policy.
3 Strategy and NPD	It is concentrated in the light green, pink, and yellow clusters. It is associated with the strategy for the development of new products and the mobilization of resources and tools necessary for this process.	Strategy, new product development; Ambidexterity; Exploration; Value creation, organizational learning; Incremental and discontinuous innovation; Dynamic capabilities; Open innovation; R&D; Knowledge management; Forecast; Diffusion; Venture capital, scenario analysis, business cycle, start-up, human capital.

After identifying the leading journals and themes, we wondered which authors were frequently published. The following text provides the answer to this question.

Who are the most common authors?

The analysis by journal revealed that the most cited authors are generally also the most cited when analyzing the set of articles. Table 3 shows the analysis of authors by journal, indicating the number of articles analyzed in each, and the number of articles in which each author appears, and Table 4 presents the ten most cited authors and the concepts and theories that they usually work with.

Table 3. Most common authors in each journal

Journal	No. of articles analyzed	Authors	Number of articles in which the author appears
Research Policy	1,938	Nelson Richard	655
		Cohen Wesley M.	650
		OECD	428
		Teece David J.	377
		Hall Bronwyn H.	363
Journal of Product Innovation Management	821	Cooper Robert G.	318
		Griffin A.	279
		Eisenhardt K.M.	178
		Fornell C.	157
		Podsakoff P.M.	154

(continue)

Table 3. Most common authors in each journal

(continuation)

Journal	No. of articles analyzed	Authors	Number of articles in which the author appears
Technovation	1,158	Cohen Wesley M.	233
		Teece David J.	193
		Nelson Richard	187
		Porter Michael E.	178
		Eisenhardt K.M.	163
Journal of Technology Transfer	475	Cohen Wesley M.	144
		Audretsch David B.	120
		Link Albert N.	114
		Shane S.	105
		Siegel D. S.	104
Technological Forecasting and Social Change	2,196	OECD	247
		Nelson Richard	242
		Porter Michael E.	201
		Linstone H. A.	168
		Cohen Wesley M.	147
R & D Management	647	Teece David J.	142
		Eisenhardt K.M.	135
		Cooper Robert G.	111
		Yin Robert K.	111
		Cooper Robert G.	81
Research-Technology Management	547	Christensen Clayton	42
		Chesbrough H. W.	36
		Chesbrough Henry	35
		Hippel Eric Von	25
		Eisenhardt K.M.	81
Journal of Engineering and Technology Management	325	Teece David J.	80
		Cohen Wesley M.	74
		Tushman Michael L.	57
		Yin Robert K.	50
		Nelson Richard	266
Industrial and Corporate Change	705	Dosi Giovanni	188
		Teece David J.	187
		Cohen Wesley M.	162
		Hall Bronwyn H.	110
		Nelson Richard	151
Technology Analysis & Strategic Management	863	Cohen Wesley M.	142
		Teece David J.	133
		Porter Michael E.	109
		OECD	96
		Teece David J.	214
International Journal of Technology Management	1,305	Porter Michael E.	210
		Nonaka Ikujiro	191
		Cohen Wesley M.	189
		Eisenhardt K.M.	161

It is possible to note by observing the most cited authors that theories such as dynamic skills, absorptive capacity, knowledge management and learning tend to be the most used in the articles. We believe that this is due to the importance of understanding the sources of knowledge for building capability and resources for innovation and value capture. Moreover, the approaches on differentiation and competition, classic themes in the strategic management of innovation, proved to be concepts of relevance to the field.

Table 4. Topics of interest for the most common authors

Most cited authors	Number of articles that cite them	Concepts/Theories they work with
Cohen, Wesley M.	1,741	Absorptive capacity, Learning
Nelson, Richard.	1,501	Innovation systems
Teece, David J.	1,326	Dynamic capabilities, innovation value capture, multi-product enterprise theory
Eisenhardt, Kathleen M.	718	Innovation in hypercompetitive markets, dynamic capabilities
Porter, Michael E.	698	Analysis of industries around five competitive forces, and the three generic sources of competitive advantage: differentiation, low cost, and focus on specific markets
Cooper, Robert G.	510	Development of new products
Hall, Bronwyn H.	473	Knowledge, green technology
Griffin, Abbie	279	Innovative capacity, B2B
Nonaka, Ikujiro	191	Knowledge management, knowledge creation
Dosi, Giovanni	188	Firm theory, innovation economics

Moreover, we would like to mention the article by Rossetto et al. (2018), who presented the structure and evolution of innovation research from 1956 to 2016, through the analysis of citations and co-citations in articles. According to the authors, between 2000 and 2016, the most common theories were: organizational learning, absorptive capacity, knowledge creation and transfer, dynamic capacities, triple helix, ambidexterity, and resource-based view.

Now that the answers to our concerns are beginning to take form, we are curious to understand what the most common methodologies and techniques in innovation studies are.

What are the most commonly used methodologies/techniques?

Although case studies have gained ground in the field of innovation management and represent the third most used group of methodologies, according to Faccin, Silva, Volkmer Martins, and Deus (2019), the field is still dominated by quantitative studies. As can be seen in Table 5, of the ten most commonly used methodologies/techniques, only two are qualitative (highlighted in gray).

Table 5. Most common methodologies/techniques in the analyzed articles

Most cited methodologies	No. of articles in which it appears
1. Social Network Analysis	158
2. Technology Roadmap	143
3. Case Study	126
4. Bibliometric	107
5. Delphi	82
6. Text Mining	58
7. Data Mining	33
8. Survey	27
9. Data Envelopment Analysis	25
10. Cluster Analysis	23

The data presented in Table 5 agree with a study by Faccin et al. (2019) using the Scopus database. The authors evaluated roughly 18,000 articles from 51 journals published between 2006 and 2015. Using VosViewer, they generated four “methodological clusters” comprised of 79 keywords, which revealed that the field is dominated by studies that predominantly use theories of

variance. Moreover, cluster analysis performed in this paper has shown that researchers in the field of innovation are potentially progressing, using different methods and units of analysis, but they still face a gap in explanations of the sequence of events that lead to the results. Finally, the authors conclude that there is a considerable space for the use of procedural approaches in studies of the area and, therefore, for the construction of theories of process data.

Keupp et al. (2012), by deepening the analysis and listing the analytical methods most commonly used by quantitative studies, also found a predominance of quantitative studies. According to the authors, the primary methods were mathematical modeling (including theoretical modeling games), simple OLS regression, panel regression (Poisson, logit, probit, etc.), confirmatory factor analysis, and survival time analysis (Keupp et al., 2012). Therefore, one notices a trend in the field to prioritize the analysis through structural equations, patentometrics, network analysis, smart data, analythica, application of algorithms, digital simulation, and artificial intelligence.

If, on the one hand, it shows that the field accepts studies using these methodologies, it also shows—as pointed out by Faccin et al. (2019)—that there is room for methodologies capable of capturing the temporality of phenomena, involving rich details that are difficult or that cannot be determined by research dominated by the positivist paradigm and the construction of theory based on variance (Langley & Abdallah, 2011). In this sense, Faccin et al. (2019) indicated that the data and analysis of processes could explain how and why an organizational entity changes and develops, allowing researchers to understand better the dynamics and processes that occur within and around “innovation activities.”

Furthermore, considering that the evolution of a field of studies also occurs through multiple methods of analysis, we realized the need to expand the methodological guidelines in innovation management studies. Nationally, this movement can be perceived through the insertion of a specific track in 2019, on “methods and new techniques of research and analysis in the field of innovation,” in the main congress of the area, EnANPAD. Moreover, important international events in the area of innovation management, such as ISPM, organized by the International Society for Professional Innovation Management, which will be held in Florence in 2019, have a specific track for receiving papers on new research methods for studies in innovation management. In addition to the insertion of tracks in important events in the area, journals such as *R&D Management* and *International Journal of Forecasting* have launched special issues to debate this academic demand. After the methodological analysis, we

examined which locations the researchers are most focused on understanding and who has funded the research.

What are the most researched regions, and who are the funding agencies?

All the top ten most common locations, except for Africa, which was mentioned in 12 articles, were countries: China, India, Germany, Brazil, Iran, Italy, France, Sweden, and Thailand. Table 6 shows the 17 most common locations.

Table 6. List of most researched locations

Locations	No. of articles that mention the location in the keywords
1. China	209
2. India	47
3. Germany	23
4. Brazil	22
5. Iran	17
6. Italy	15
7. Africa	12
8. France	12
9. Sweden	12
10. Thailand	12
11. United Kingdom	12
12. Asia	11
13. Canada	11
14. Latin America	11
15. Russia	11
16. South Africa	11
17. South Korea	11

It is noteworthy that seven are developing countries (dark gray), and three are continents made up of developing countries (light gray), which indicates that researchers are interested in publishing articles on these locations and that it is crucial to establish research partnerships between developing countries for publication. Thus, note, the recent call at the national level, No.

5/2019, opened by CAPES to strengthen South-South cooperation and, at the international level, the special issues on China and emerging countries of the *Technological Forecasting and Social Change* and the *Journal of Engineering and Technology Management* journals, respectively.

A total of 79.1% of articles mention developing countries in their keywords, considering the 17 most mentioned locations. Moreover, Brazil is the fourth most studied country, showing that there is worldwide interest in the area of innovation management in Brazil and that this is a fertile field of research for Brazilians. Although it is an important field for research, researchers should be aware of the need to explain how a Brazilian study could contribute to global theories and learning in a field of study. We believe that many emerging countries, such as Brazil offer

opportunities to refute theories based on developed countries, even offering substantive answers to this.

Finally, China has awakened the most considerable interest in innovation management worldwide, comprising 45.5% of the articles published among the most researched locations. Although the most studied locations are developing countries, except for China and Taiwan, the funding agencies are not from developing nations; on the contrary, most are from developed countries. Brazilian funding agencies are not even present in Table 7, as only three were among the 100 funding agencies, occupying positions 32 (CNPq), 42 (FAPESP), and 69 (CAPES). Thus, despite being the fourth most studied country in the field, Brazil is far from being the location that most invests in studies in the area.

Table 7. Funding organizations and countries of origin

Funding organizations	Country of origin	No. of articles funded by the organization
1 National Natural Science Foundation of China	China	146
2 National Research Foundation of Korea (NRF)	South Korea	83
3 National Science Foundation	United States	74
4 European Union	European Union	49
5 UK Economic and Social Research Council	United Kingdom	49
6 European Commission	European Union	48
7 Ministry of Science and Technology, Taiwan	Taiwan	35
8 National Science Foundation of China (NSFC)	China	32
9 Social Sciences and Humanities Research Council of Canada	Canada	30
10 Spanish Ministry of Economy and Competitiveness	Spain	27
11 Engineering and Physical Sciences Research Council (EPSRC)	United Kingdom	25
12 National Science Council of Taiwan	Taiwan	25
13 Youth Project of Ministry of Education, Humanities and Social Sciences Planning Funding	Singapore	25
14 Finnish Funding Agency for Technology and Innovation (Tekes)	Finland	23
15 Fundamental Research Funds for the Central Universities		22

However, it is important to emphasize that many Brazilian researchers are not used to mentioning funding agencies when publishing articles and/or presenting papers at congresses. This is a practice established at the international level with which we must be more rigorous in Brazil, even to publicize our research funding agencies, which is extremely important for international partnerships, for example.

PRESENT AND FUTURE RESEARCH AGENDA

If, in the past, the major themes that underpinned the field of innovation were linked to strategy, R&D, development of new products, technology, and entrepreneurship focusing on regional contexts, for the future, it seems that new themes and their internationalization will become more prominent, with the classical areas continuing to be of academic interest (Rossetto et al., 2018). Our conclusions on the emergence of new themes are based on the algorithmic analysis of the “hot terms” in the articles extracted from the WoS (which appear in more recent years; continue not to be specific; involve a group of actors; avoid particular biases; and with increased interest yearly) (Table 8), in emerging terms by year (from 2013 to 2017) (Exhibit 3), in the content of special issues of 11 journals (Exhibit 4), and in the themes presented in tracks of the most relevant world events.

Table 8. Emerging themes

Emerging themes	Number of articles in which it appears	Emergency Score
1. Emerging Economy	31	3.226
2. Catch Up	30	4.487
3. Service Innovation	23	2.177
4. Value Chain	21	2.105
5. Iran	17	3.4
6. Industry Dynamics	13	1.866
7. Resilience	13	1.989
8. Internal Collaboration	12	1.856
9. Medical Innovation	12	2.194
10. Additive Manufacturing	9	2.895
11. Socio-Technical Transition	9	1.792
12. Public Subsidies	7	2.017

We noted an explosion of new themes related to the activities of knowledge intensive entrepreneurship, collaboration, and territories—with the emergence of themes such as innovation ecosystems, creative economies, business model in digital startups, both in tracks of events (R&D Management Conference, ISPIM Innovation Conference, EnANPAD, SciBiz Academy) and in the special issues of the journals—as shown in Tables 8 and 9, and Exhibit 3.

Exhibit 3. Emerging themes by year (from 2013 to 2017)

2013	2014	2015	2016	2017
Technology roadmap—uncertainty	3D printing—additive manufacturing	<u>Entrepreneurship</u> —social enterprise	Big data—technology roadmap	<u>Knowledge management</u> —social media
TT—third mission / university	Energy—sustainability	Network —spin-off	Business innovation—value capture	Quadruple helix—TT
Business model—capability/network/OI	Climate—energy	Autonomous vehicle—technology	Forecast—solar energy	R&D—skill
Climate-energy efficiency	Creative—crowdsourcing	Association rule— <u>patent</u>	Medical innovation—research translation	Biosimilars— <u>innovation system</u>
<u>Policy</u> — solar energy	Emerging Market—reverse innovation	Catch up—Iran	SME—technology-based firms	Absorptive capacity—individual level
Nanotechnology—scenario analysis		Geography—technology	GVC (global value chain)—venture capital	Distributive intelligence—global brains
Acquisition-SME				Iran—S&T

Moreover, some themes, such as knowledge management, patent, policy, entrepreneurship, and innovation system, appeared throughout the period examined and continue to stand out among emerging terms and in some special issues, showing that they are important themes requiring further study.

Exhibit 4. Special issues by journal

Journal	Special issues (sample)
<i>Research Policy</i>	<ol style="list-style-type: none"> 1. New Frontiers in Science, Technology and Innovation Research from SPIRU's 50th Anniversary Conference 2. Academic Misconduct, Misrepresentation, and Gaming 3. Catch-up and changes in industrial leadership 4. Innovative start-ups and policy initiatives: heterogeneity, impact and implications 5. Hospitals and Innovation 6. <u>Patent Use</u> 7. Blade Runner Economics 8. Profiting from Innovation in the Digital Economy 9. The sciences are different and the differences matter
Journal of Product Innovation Management	<ol style="list-style-type: none"> 1. Design Thinking and Innovation Management Matches, Mismatches and Future Avenues 2. The Human Side of Innovation Management 3. Digital Transformation and Innovation Management: Opening Up the Black Box
Technovation	<ol style="list-style-type: none"> 1. DNA of The Triple Helix 2. East-Asia automotive 3. Promoting Technology-Intensive Value Creation in Entrepreneurial Firms and Small Business through Intervention—Policy, Regulation and Support 4. Managing intrapreneurial capabilities 5. Surviving the Valley of Death 5. Technology Business Incubation 6. Innovation and Standardization
The Journal of Technology Transfer	<ol style="list-style-type: none"> 1. Economic Technological and Societal Impact of Entrepreneurial Ecosystems 2. Incubators and regions 3. Technology Transfer Dimensions of Agri-Science to Agri-Business 4. Macro, Meso and Microfoundation Perspectives of Technological Transfer 5. International Perspective on Innovation 6. <u>National Systems of Innovation</u> 7. <u>National Systems of Innovation</u> 8. Academic Engagement and University-Industry Linkages 9. Technology Transfer and entrepreneurship: Cross-National analysis
Technological Forecasting and Social Change	<ol style="list-style-type: none"> 1. Social and Economic Effect of Green Technologies and Policies in the Transition Economies of Northeast Asia 2. Changing Organizations and Markets: Knowledge Co-Creation, Business Model Innovation, and Adaptive Management for Sustainable Development 3. Public policy for open innovation: Frameworks, priorities and mechanisms 4. Incubators and Regions 5. Global Shifts in Technological Power 6. Global and innovative solutions to climate change and its effects on the economy and society
R&D Management	<ol style="list-style-type: none"> 1. How customer involvement and external knowledge influence R&D performance 2. Industry and International Aspects on R&D Management 3. How IP, Knowledge and Patents crucially influence R&D management 4. How to handle R&D management in International Environments 5. Beyond Triple Helix Toward Quadruple Helix Models in Regional Innovation systems: Implication for Theory and Practice 6. Decision Making and Measurement in R&D 7. Incubation, Decision Making and Knowledge Interaction in Business Modeling 8. Effects of Individuals and Teams on R&D Outcomes 9. Strategy and Policy Decisions in R&D Management 10. Evaluation and Measurement in R&D 11. Management of External resources in R&D 12. Innovation Management Research Methods 13. Business Model and Innovation 14. Transferring Knowledge 15. Collaboration Inside and Across Industries
<i>Journal of Engineering and Technology Management</i>	<ol style="list-style-type: none"> 1. Disruptive Innovation and Entrepreneurship in Emerging Economies

Supporting our results on the most researched locations, developing countries seem to be a promising empirical field, more specifically for the typical phenomena of emerging economies (frugal innovation, shanzhai innovation, reverse innovation, and jugaad innovation, among others) (Zedtwitz, Corsi, Søberg, & Frega, 2014). However, these authors suggest, from another perspective, a densification of theoretical approaches and the use of an analytical instrumental oriented to internationalization strategies and global innovation processes, focusing on local solutions that conquer world markets.

Regarding the new sectoral dynamics, two dimensions are relevant. The new digital industry 4.0 (3D printing, additive manufacturing) and service innovation (big data, artificial intelligence, smart analytics, smart and digital cities, among others) are potentially attractive research themes. In the services sector, health management and medicine stand out with the themes of bio and nanotechnologies and with approaches to innovation and sustainability, especially related to the alternatives for eco-innovation, sustainable energy, climate change, mobility, electric vehicles, and photovoltaic energy. Moreover, we observe a flourishing of scientific production on the themes of social, inclusive, and responsible innovation, and approaches on digital economy and circular economy, so that studies on the adaptation of companies to these models become increasingly frequent. Such themes are perfectly connected with the analysis of emerging economies (Zedtwitz et al., 2014), and institutional and evolutionary approaches to technological learning (catch up) or integration (upgrading) in global chains (Fagerberg, Lundvall, & Srholec, 2018).

Furthermore, theoretical lenses such as dynamic capabilities, triple helix, and knowledge management, which were the theories most mentioned by the primary authors, continue to appear in the emerging terms and some special issues, although they do not seem to be the most demanded for publication. This indicates that such theories may be reaching a degree of maturity that allows some consensus. However, that does not mean that there is no progress to be made. According to Albort-Moranta, Leal-Rodríguez, Fernández-Rodríguez, and Ariza-Montes (2018) on the theme of dynamic capabilities, for example, after the significant growth in the number of publications until 2012, there was a drop in this number, characterizing the emergence of what they called the “maturity phase.” However, despite the advances, there are still some gaps, among which the authors indicate the need for process-based approaches, agreeing with what Faccin et al. (2019) stated about innovation management studies in general.

The approaches of analysis and intelligence (forecast, roadmap, delphi, social networks, simulation of scenarios, and

smart data, among others) with the application of technological tools and software constitute a promising agenda for future studies in innovation management, to raise the quality and competitiveness of articles for international publication. The themes presented in Exhibit 2 are maintained and expanded with the insertion of specific terms such as big data, 3D printing, and nanotechnology in Theme 1; quadruple helix, innovation ecosystems, and smart cities in Theme 2; and distributed intelligence and global brains in Theme 3. Finally, the interest in experiences based on international and institutional comparative analyses between countries, regions, sectors, and markets has been increasingly used as an evaluation criterion by the editorials of top journals.

CONCLUSION: THE CHALLENGES OF BUILDING AN INTERNATIONALIZED AND CRITICAL RESEARCH AGENDA

The great challenge for conducting new research projects and for scientific production in the field of innovation is to define the concept and scope of the research problem according to the relevance of the theoretical gap or the technological application, and what this contribution to society means. Whether academic or technological (*applied research*), research should always prioritize excellence in their theoretical and methodological construction, estimating the potential scientific, economic, social, environmental, and dissemination impacts. The rule is simple: the greater the relevance, rigor, and quality of the methodology, the better its real chances of academic and applied contribution.

Another critical issue that should be considered when improving the attractiveness and competitiveness of research for publication in a top journal is whether the research topic or problem has relevance and whether it adheres to the interests of the international or national community. The ability of researchers to identify the themes and their theoretical, applied, and methodological gaps, and develop them based on dynamic and well-structured methodologies, is also considered when the quality of the contributions is evaluated.

In quantitative studies, we noted a transition from study case methods to a more sophisticated application of robust samples using structural equation models, and intelligence techniques and analysis—road mapping, forecast, smart data, and patentometrics, and analysis and simulation of social networks. The combination of one or two techniques, the analysis of robust intertemporal information databases or the inclusion

of international or regional comparative sampling results in a comprehensive result that can be scientifically validated and is more attractive for publication. In qualitative studies, procedural approaches seem to be a promising path for longitudinal studies that seek, for example, to analyze what certain innovation practices are and how they change. It is an alternative approach to the traditional positivist studies of the area.

Regarding the themes addressed by the seminal works that founded and formed the field of theoretical studies of innovation, we note the emergence of new natural themes that associate the movements of digital, institutional, environmental, and global market transformation with the entry of emerging economies and Southeast Asia. The themes of learning and integration into global networks and value chains, industry and services 4.0, sustainability, digital, and service economy, open and collaborative innovation, innovation ecosystems, startups, and intensive entrepreneurship in knowledge, innovation, and social inclusion are sensitive and reflect these profound changes in the macro, meso, and microsystemic dimensions of innovation studies. Moreover, it is possible to note a renewed interest in the studies of technological adoption and acceptance and an emerging interest on the experience and behavior of innovative digital consumption, motivated by the transversal dissemination of artificial intelligence.

Finally, the theoretical approaches to innovation management have been based on the combination of vision based on resources, capabilities, ambidexterity, use of knowledge sources, learning, and catch-up strategies and the approaches addressing the institutions and the development of nations, sectors, regions and companies—national systems, sectors and ecosystems of innovation.

Our final recommendation is that researchers critically reflect on the adoption and indiscriminate use of the theoretical mainstream approaches for the study of the phenomenon of innovation in its place of origin. Innovations must necessarily be applied and thought within the limits and real dynamics of their institutional and social context, considering societal and cultural differences and their stage of economic development and global inequality.

REFERENCES

- Adams, R., Bessant, J., & Phelps, R. (2006). *Innovation management measurement: A review*. *International Journal of Management Reviews*, 8(1), 21-47. doi:10.1111/j.1468-2370.2006.00119.x
- Albort-Moranta, G., Leal-Rodríguez, A. L., Fernández-Rodríguez, V., & Ariza-Montes, A. (2018). *Assessing the origins, evolution and prospects of the literature on dynamic capabilities: A bibliometric analysis*. *European Research on Management and Business Economics*, 24(1), 42-52. doi:10.1016/j.iiedeen.2017.06.004
- Carayannis, E. G., Grigoroudis, E., Campbell, D. F. J., Meissner, D., & Stamati, D. (2018). *The ecosystem as helix: An exploratory theory-building study of regional co-operative entrepreneurial ecosystems as Quadruple/Quintuple Helix Innovation Models*. *R&D Management*, 48(1), 148-162. doi:10.1111/radm.12300
- Cirera, X., & Maloney, W. F. (2017). *The innovation paradox developing-country capabilities and the unrealized promise of technological catch-up*. Washington, DC: World Bank Group.
- Crossan, M. M., & Apaydin, M. A. (2010, September). *A multi-dimensional framework of organizational innovation: A systematic review of the literature*. *Journal of Management Studies*, 47(6), 1154-1191. doi:10.1111/j.1467-6486.2009.00880.x
- Etzkowitz, H., & Zhou, C. (2017). *Triple Helix: Innovation and entrepreneurship university-industry-government*. *Advanced Studies*, 31(90), 23-48. doi:10.1590/s0103-40142017.3190003
- Faccin K; Silva, L. M.; Volkmer Martins, B.; Deus, E. P. (2019, June 6-19). *Process data: A methodological opportunity for innovation management studies*. *XXX ISPIIM Innovation Conference*, Florence, Italy.
- Fagerberg, J., Lundvall, B., & Srholec, M. (2018). *Global value chains, national innovation systems and economic development*. *The European Journal of Development Research*, 30(3), 533-556. doi:10.1057/s41287-018-0147-2
- Keupp, M. M., Palmié, M., & Gassmann, O. (2012). *The strategic management of innovation: A systematic review and paths for future research*. *International Journal of Management Reviews*, 14(4), 367-390. doi:10.1111/j.1468-2370.2011.00321.x
- Langlely, A., & Abdallah, C. (2011). *Templates and turns in qualitative studies of strategy and management*. In D. D. Bergh, & D. J. Ketchen, *Building methodological bridges* (pp. 201-235). Emerald Group Publishing Limited.
- Marchi, V. De, Giuliani, E., & Rabelotti, R. (2018, July). *Do global value chains offer developing countries learning and innovation opportunities?* *The European Journal of Development Research*, 30(3), 389-407. doi:10.1057/s41287-017-0126-z
- Motta, G., Garcia, P. A. A., & Quintella, R. H. (2015). *A patent-scientometric approach to venture capital investment prioritization*. *Journal of the Association for Information Science and Technology*, 66(4), 765-777. doi:10.1002/asi.23205
- Rossetto, D., Bernardes, C. R., Borini, F. M., & Gattaz, C. (2018). *Structure and evolution of innovation research in the last 60 years: Review and future trends in the field of business through the citations and co-citations analysis*. *Scientometrics*, 115(3), 1329-1363. doi:10.1007/s11192-018-2709-7
- Zedtwitz, M. V., Corsi, S., Sørberg, P. V., & Frega, R. (2014). *A typology of reverse innovation*. *Journal of Product Innovation Management*, 32(1), 12-28. doi:10.1111/jpim.12181