

DESORPTIVE CAPACITY: an analysis in national and international publications

ELVIS SILVEIRA-MARTINS

UNIVERSIDADE FEDERAL DE PELOTAS (UFPEL)

CARLOS RICARDO ROSSETTO

UNIVERSIDADE DO VALE DO ITAJAÍ (UNIVALI)

Agradecimento à órgão de fomento:

This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001

DESORPTIVE CAPACITY: an analysis in national and international publications

1. INTRODUCTION

The identification, management and application of knowledge in order to generate innovation in business activities has been the target of the research agendas of scientists interested in these topics, especially those associated to the strategy organizational field, as well as decision makers involved in selection of the best decisions to obtain superior performance of their companies.

In this context, absorptive capacity (ACAP), known as the company's capability to identify, assimilate, transform and, apply knowledge (COHEN; LEVINTHAL, 1990; ZAHRA; GEORGE, 2002), in recent decades it has received attention as well identified as a strategy to achieve organizational performance. However, emphasize that this capability does not have the domain of transferring the knowledge to the market, being necessary the complementarity of another capability, the desorptive.

Desorptive capacity literature merges the concepts of absorptive capacity, which was the main point to the innovation literature of the 1990s, with the literature on dynamic capabilities, which propelled much of the literature on strategy of the 2000s, developing a research-driven approach on open innovation (HU; MCNAMARA; MCLOUGHLIN, 2015).

The desorptive capacity known as the capability to transferring the generated knowledge by the organization to external partners, usually conceived by the innovation licensing method. Denford and Ferriss (2018) point out, this type of capability may be another value for company's advantage. A desorptive capacity can directly generate revenue, or achieve other targets, and enable the company to position itself as a major player in the industry. This capability can make the organization an important player in the industry, strengthening the company's relevance, which will lead to financial support, or other positive non-financial outcomes, in the future.

According to Hossain (2013), although there are many endeavors to explore and understand the absorptive capacity and the same cannot be acknowledged for the desorptive capacity. Even though the research outcomes are not strong, it is possible to recognize a set of trials using the construct, however, no research was identified as the characteristics mapper of what has already been researched and to point what still needs to be researched.

The research target aim is to analyze the scientific production on the desorptive capacity available in national and international bases, providing a background about what has already been produced and indicating new research possibilities.

In this way, in five sections the research is structured, in addition to this introduction. In the next section the theoretical basis on desorptive capacity will be shown and explained. The following section will introduce the methodology that guided the research development, then, in the fourth section counts on the analyzed survey data. Eventually, in the last section the research findings, limitations and suggestions for the research agendas will be discussed.

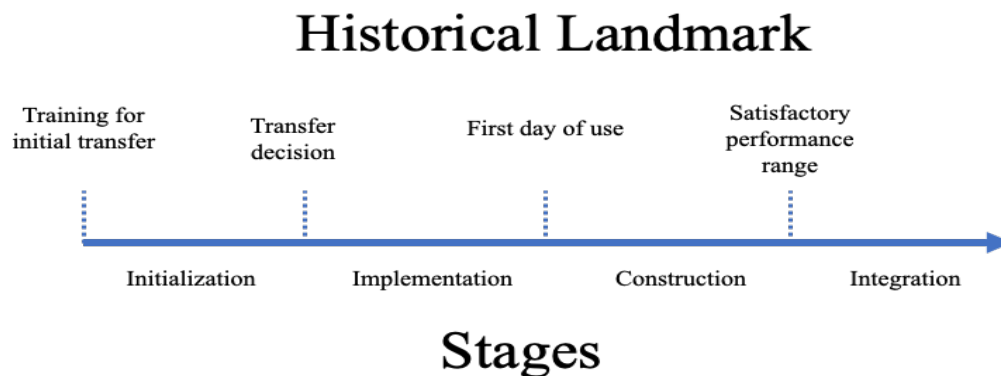
2. DESORPTIVE CAPACITY

The discussions on absorptive capacity based in Linchtenhaler and Linchtenhaler (2010) proposed desorptive capacity concept, previously also called by Herzog (2011), as market capability applied. Linchtenhaler and Linchtenhaler (2010) explains that while the absorptive capacity refers to the organization's capability to recognize, assimilate and apply external knowledge, desorptive capacity is associated with the organization's capability to transfer its own

knowledge to external partners. Moreover, the fact that companies often develop non-marketing technologies could be assigned to a lack of absorptive capacity.

Szulanski (2000) explains that, the transfer is based on four stages: initialization, implementation, construction and, integration. The author highlights that procedural difficulties may exist along this path. The reasons that influence the transfer opportunity tend to be linked to the obstacles during the initialization step, since the reasons that influence the execution of the transfer are likely to be the subsequent implementation steps. The steps can be seen in Figure 1.

Figure 1 - Knowledge transfer process



Source: Szulanski (2000)

Consequently, Dell'Anno and Giudice (2015) points out, the role of the absorptive capacity emerges as a mechanism of liberation of knowledge and technology, and the process is simplified by the system's intrinsic renewal capability, where the new knowledge boosts out the knowledge and/or prior technology. Therefore, the absorptive capacity can be analyzed in two steps: i) identification of technology transfer opportunities; and, ii) transfer of technological knowledge. In this perspective, identifying potential technological assets to be exploited externally is a management challenge, often underestimated, but decisive for companies (LINCHTENHALER; LINCHTENHALER, 2010).

In a research that sought to explore the collaborative flow of knowledge activities, Braun *et al.* (2012) identified that the quality of information transfer depends on both the absorptive and the absorptive capacity of the cooperator (active: impulse or passive generators: impulse receptors). This positioning is supported by Linchtenhaler (2013). However, for Braun *et al.* (2012), the absorptive capacity is primarily linked with their existing contacts in search of suitable partners to keep transaction costs as low as possible.

Only if none existing contacts are appropriate and/or unavailable, companies carried out a broader survey. In addition, the presentation of the absorptive capacity in terms of project idea, the company's capabilities, and selection of the right platforms for communication become crucial. Currently companies seek to diversify their search to attract business partners with the right resources and knowledge. Moreover, in the research developed it was not possible to identify that company's size, corporate culture or corporate governance played a prominent role in the process, in contrast the company and the explicit communication of knowledge ends up being the most important.

According to Ziegler *et al.* (2013), the absorptive capacity importance is associated with the trend of open innovation, that in fellowship, requires the manager to rethink the management

of patents considering the increase in the external exploitation of these to improve the efficiency of the patent portfolio. While some pioneering companies use the exploitation of external patents with great financial and strategic success, many others companies experience substantial management obstacles. As a matter fact, the authors could identify four main factors that influences the companies' management as a function of external patents exploitation: i) type of value creation; ii) organizational structure; iii) Initiative locus (defines at what point in the process the company actively starts to manage the external exploration); and, iv) extension of the transfer of know-how next the patent. Besides that, the authors identified three archetypes of external patent exploitation with different levels of desorption, which can be seen in Table 1.

Table 1 - Arithmetic Absorption Capacity

Archetype	Concept
ad hoc	The business strategy of companies adopting the ad hoc mode is focused on product marketing. Its intellectual property strategy is optimized to exploit its patents internally in its own products and processes. Exploitation of external patents is not the focus of its intellectual property management and, therefore, occurs only on an ad hoc basis, and is mainly initiated above all outward by companies willing to use certain patents. Patent licensing and sales projects are primarily conducted to generate additional revenue or recover costs. However, these companies basically intend to create a financial value through the external patents' exploitation.
Hybrid	The hybrid mode archetype includes companies that follow a dual intellectual property strategy. Companies see internal and external exploitation as an equal resource to produce benefits from their patent portfolios. The main exploitation reason of external patents is, therefore, often of a qualitative and innovative nature, such as entry into new markets difficult to access through a product strategy, introduction of an industrial standard or transfer of development and production to a partner company due to limited internal resources.
Leverage	Companies that follow an approach of leverage use external patent exploration as its business strategy. For this reason, they are meant to create strategic and financial value to ensure the company survival. In collaboration, the organization and processes management are adapted to the external patents exploitation and are highly professionalized.

Source: Ziegler *et al.* 2013.

Wherefore, when there is a higher desorptive capacity a strong and positive link is projected between research and development (R&D) investment and company performance. On the other hand, when the desorptive capacity is weaker, the positive link between R&D and company performance is also declining. Therefore, suggests considering that the desorptive capacity is crucial for investment in R&D and for company's performance. To clarify, there is a limit to the company's capability to increase its performance, however, if there is a desorptive capacity increase in communion with investments in R&D, the company's performance tends to increase (KIM; KIM; CHO, 2014; DENFORD; FERRISS, 2018).

From the other hand, developing one's own innovative capability requires a time-consuming process, and one alternative is to license a technology. So, decision-makers should pay attention

simultaneously to the company innovation characteristics, such as absorptive capacity, licensed technology characteristics (licensed scale and technological era) and, finally, the company's disorienting capacity, which may shorten the apprenticeship, and consequently improving competitive advantage in product markets (WANG; ROIJAKKERS; VANHAVERBEKE, 2014; BIANCHI; LEJARRAGA, 2016; BRAVO; MORENO; LLORENS-MONTES, 2016). Furthermore, in a complement to this information Yoo (2011), assembling several surveys it introduced a chart with the success factors in technology transfer as can be regarded in Table 2.

Table 2 - Success factors in technology transfer

FACTOR'S DESCRIPTION	LITERATURE REFERENCE
Participation in the acquisition of external technology	Lowe <i>et al.</i> 1998.
Process of exploitation of systematic external technology	Lichtenthaler (2008)
Organizational culture company	Chesbrough (2003)
The company's willingness to transfer technology	Lichtenthaler (2009)
Committees established for technology transfer Multidisciplinary panels of technology experts Use of the online market, such as Yet2.com Encouragement to the business unit that owns the technology Use of various methods of intellectual property assessment Person-to-person interaction Middle-level alliance management Systematic decision-making frameworks Mutual trust between the licensor and the licensee	Bianchi <i>et al.</i> 2011.
Short-term project teams to identify licensing opportunities Networks with other companies Executive commitment with licensing or sale	Lichtenthaler (2011)
Dedicated technology transfer function Technological and market knowledge Enterprise Licensing Strategy Organizational culture company Best Practices and Technology Transfer Routines Industrial Reliability Relationship Licensing Experience Capability-based learning effect	Lichtenthaler and Lichtenthaler (2010)

Source: Yoo (2011)

Thereby, the open innovation process of an organization is centrally associated with the absorptive capacity, since it is enabled by the company's individual capabilities level, which lead to the development of the absorption capacity and the absorptive capacity (BARCHI, GRECO, 2018).

3. METHODOLOGY

The Bibliometric methodology supports this research. However, the consultation took place in the following databases: CAPES, SPELL, PROQUEST, EBSCO, Science Direct, Springer Link.

How the key-descriptors were used: desorptive capacity, desorptive capacity, DCAP. Thus, articles written in Portuguese, English and Spanish were added to this research methodology.

According to these steps, it was possible to identify in the databases of 89 completed papers, however, only 83 papers could be downloaded on the system, since many papers were not found with their correct link addresses or the file do not exist. After comparing the downloaded papers, it was observed that there were 8 papers repeated, in addition 52 without concordance with the research target, since the term desorptive capacity in many languages was employed in a generic way and/or associated with other knowledge areas, e.g., chemistry. In this way, overall 23 papers were considered for driving this research. In the Table 3 all the search steps and selection of the papers is possible to verify in a summarized way. It is important to emphasize that this research was also performed unsuccessful in these databases: Spell and Redact.

Table 3 - Search process summary

DATA BASE	DESCRIPTORS	TOTAL	DOWNLOAD	REPEATED	WITHOUT AGREEMENT	TOTAL
CAPEs Scientific Journals Gateway	Capacidade desorptiva	6	5	8	52	23
Proquest	Desorptive capacity	36	34			
Ebsco		6	6			
Science Direct	Capacidad de desorción	8	7			
Springer		31	31			

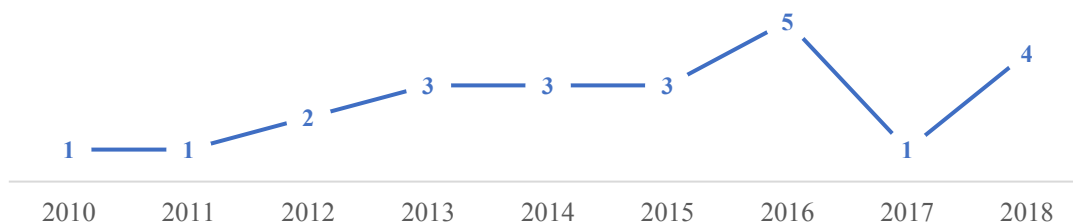
The data analysis, according to the structure introduced by Ribeiro-Martins and Silveira-Martins (2018), understood different steps, such as: i) temporal evolution of the publications scale; ii) identification of Scientific Journals Gateway and its relative publications frequency; iii) understanding the Bradford law ($1: n: n^2 \dots$) about the *core* of Scientific Journals Gateway and the execution of the calculation; iv) identification of the methodological research types used in the work's development; v) identification of the Freeman centrality metric (asymmetric model with no diagonal validity) for the authors network and universities; vi) measurement of the power of Bonacich for the authors network and universities; vii) comparative with the Lotka law standard ($1/n^2$); viii) authors and works identification with greater references; ix) temporal clustering of the topics associated with the desorptive capacity (via title and abstract); x) analysis of proposals for future research. The software Numbers, version 4.0.5 provided the data processing for tabulation, organization, and calculations, in addition to UcinNet and NetDraw for developing the relationship networks and VOSviewer version 1.6.11.

4. DATA ANALYSIS

When analyzing the published papers, the oldest publication identified is from the 2010s. There has been an evolution in publications in the following years, where in 2016 is marked by the

largest number of publications followed by 2018. There is an exception in 2017, in all years there has been an evolution number of publications interested in the topic of desorptive capacity. Although it cannot be asserted the cause of the identification of only one paper in 2017, it can be verified that there is no decrease due to the low attractiveness of the construct, since in 2018, four published were identified and making it the second largest quantitative (loosing for 2016). The increasing in the publication number can be seen in Graph 1.

Graph 1 - Evolution through the time of the publications number.




When checked the scientific journals with the greater publications number on the subject, the scientific journals R&D Management (H index = 86) corresponded to 13.04% of published papers, thus stands out as the one with the greatest interest in desorptive capacity. The Scientific Journal of Product Innovation Management (H index = 119) and the Scientific Journal of Knowledge Management (H index = 90) with 8.69% were identified. However, other scientific journals, each representing 4.34% of the overall number of published papers, have also shown interest in research aimed at the desorptive capacity, such as: i) California Management Review (H index = 114); ii) Group Decision and Negotiation (H index = 50); iii) International Journal of Entrepreneurship and Innovation Management (H index = 19); iv) International Journal of Technology Management (H index = 48); v) International Journal of Operations & Production Management (H index = 112); vi) International Journal of Physical Distribution & Logistics Management (H index = 85); vii) The Journal of Technology Transfer (FI = 2,932); viii) Journal of Innovation and Entrepreneurship (H index = 8); ix) Scientometrics (H index = 90); x) Supply Chain Management: An International Journal (Qualis/CAPES = A1); xi) Technology Analysis & Strategic Management (H index = 56); xii) Technovation (H index = 102); and; xiii) World Journal of Science, Technology and Sustainable Development (Qualis/CAPES = B2). Another 13.02% represents book chapters.

The scientific journals identification that demand publications on desorptive capacity and/or have an interest in this subject favors the scientists with adherence to the construct, since they already have a list of possibilities for their manuscripts' submission. In addition, the most of the scientific journals have prestige evaluation when analyzing the quality indicators (H-index, Impact Factor and Qualis/CAPES).

The productivity scientific journals analyzed, according to the Bradford Bn law (20t/3g), the core of the topic desorptive capacity (Bn = 6.67) were identified with the scientific journals' concentration: R&D Management, Journal of Product Innovation Management and Journal of Knowledge Management. The others are considered as belonging to the subject extension zones. However, when the multiplier (mB) from Bradford on zones 1 and 2, the following coefficients were: ${}^mB = 2.00$ and ${}^mB = 1.17$ consecutive. In this way, depending on the values of mB did not remain constant, as can be seen in Table 4, it was not possible to assert the Bradford law. Lousada *et al.* (2012) points out that this background is due to the fact that topic is in a process of maturation,

considering the publication's amount that as far as they are studied and known tend to provide a greater dispersion in scientific papers that are still not being contemplated and/or with low publication index.

Table 4 - Papers distribution to each area - Bradford Act

Zone	Scientific Journals Gateway	Papers	^m B
Core	3	7	-
Zone 1	6	6	2.00
Zone 2	7	7	1.17
$\bar{x} mB$			1.58

When analyzed the research types developed by these scientists, 34.78% refers to theoretical reviews, 30.43% to qualitative research and 34.78% to quantitative research, representing a balance between types. Along the papers analysis it was found the existence of a validated instrument for the specific measurement of the desorptive capacity developed by Yoo (2011). The future research importance is in Table 5 and can be seen the variables used for measurement. The researchers Bravo, Moreno and Llorens-Montes (2016) also introduced/developed an instrument of desorptive capacity, however, directed to the *supply chain area*

Table 5 - Applicable variables for measuring the desorptive capacity

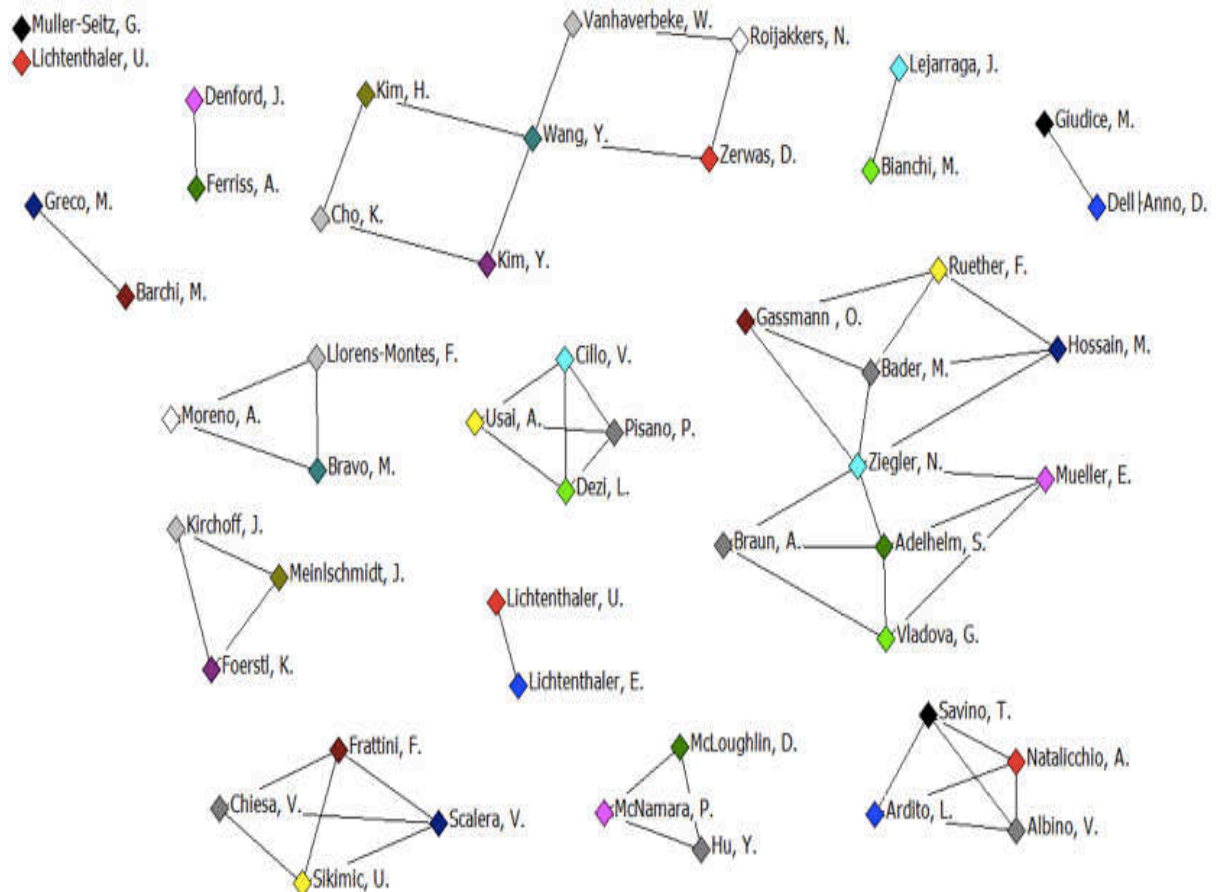
Dimension	Description	Variables
Knowledge	Company's understanding about the technology and market from other industries	Market knowledge about other industries
		Technological knowledge about other industries
Planning	Company willingness for technology transfer	Strategic planning for technology transfer at an early stage
		Commitment of the executive with the licensing or technology sale
		Positive company's attitude in relation to the technology transfer
Transfer	Capability to manage the negotiation and transfer process	Formulation of technology transfer process
		Licensing Experience
		Formation of articulation committees for development
		Use of various methods of intellectual property assessment
		Mutual trust between the licensor and the licensee

The connections analysis between universities/organizations (Freeman's centrality) makes it possible to highlight Politecnico di Milano and Sichuan University with 4 input ties each. In the case of the University of Sassari (University of Naples), the University of Sassari, University of Amsterdam, the University of Naples, the University of Naples, Esade Business School are representative of 3 ties each. Complementing the analysis, when analyzing the power of Bonacich, the universities Politecnico di Milano and Sichuan University, presented the same value $C_i^n = 4,000$ and when analyzed the normal values represent $C_i^n = 12,780$. However, it can be asserted that these institutions are considered, within the network, as those that have representativity (honor).

Another analysis carried out refers to the scientific networks developed by the researchers for the development of experiments related to the topic of desorptive capacity. Thus, a large network with nine researchers involved, in addition to other smaller networks. Also, there are five partnerships for the research's development between (only) two researchers.

It is also worth noting that a researcher (Gordon Müller-Seitz) has chosen not to develop partnerships for development. The researcher Ulrich Lichtenthaler was identified at a given time without developing partnerships and/or networks and, at another time, as a co-author in researches with Eckhard Lichtenthaler, as can be seen in Figure 3. The lack of a large researchers' network interested in developing research on desorptive capacity supports the findings of the Bradford Act, when it points out that research is in the maturation process. However, the identification of the connections made in Figure 3, may help interested in the construct to approach and densify and growth the discussion on desorptive capacity.

Figure 3 - Researchers Networks



Also, when analyzing Figure 3 from the connections perspective between authors, in terms of links the researchers Llorens-Montes, Bravo and Moreno are equivalent with 4 input loops and 4 output loops, thus, based on the Freeman's centrality, it can be asserted that these researchers highlight as the main networks cooperation makers for the development of research on desorptive capacity. From the other view, when the power of Banacich was verified, the researchers Bravo, Moreno and Llorens-Montes presented the same value $W_i = 4,000$ and when analyzed the normal values represent $C_i^n = 11.590$. In this way, these researchers are considered the most prestigious when analyzed the network of its networks.

In the aftermath, the published papers number by author/co-author was analyzed. 91.66% of the researchers published only 1 paper. This percentage exceeds by 30.86% the international standard of Lotka's Law (L^{Lotka}). This same background is not reproduced with researchers who published 2 (6.25% and $L^{Lotka} = 15.20\%$) and 4 papers (2.08 and $L^{Lotka} = 3.80\%$).

Cardoso (2005) points out that indicators like these indicate that the scientific production on this construct is below the international standard, when analyzed from the Lotka's Law perspective. The growth and maturity of researches can explain this context process on desorptive capacity, such as identified when analyzing the Brandford Law and the temporal evolution of the research (Chart 1). The quantitative analysis of the Lotka law standard can be seen in Table 6.

Table 6 - Analysis standard Lotka law

Papers by Author	Absolute Frequency	Relative Frequency	Standard Lotka Law
1	44	91.66%	60.80%
2	3	6.25%	15.20%
3	-	-	6.80%
4	1	2.08%	3.80%
≥ 5	-	-	13.4%
Total	48	100%	100%

After 1,400 references cited in the surveys was analyzed and the author Lichtenthaler was the most mentioned totalizing 62 times. And among its researches entitled 'A capability-based framework for open innovation: Complementing absorptive capacity' was the one that received the greater emphasis reaching 12 times mentioned. Although, the second most referenced author was Chesbrough (32 times) his work entitled 'Open Innovation: The New Imperative for Creating and Profiting from Technology, Harvard Business School Press, Boston 'was the most cited in the surveys analyzed (13 times). In the Table 7, a table with the 10 authors with the highest number of references and their respective references can be seen.

These results are important to place beginning researchers in the discussions on the topics on which are the surveys considered relevant by the scientists who already do research on desorptive capacity. Still, the desorptive capacity is directly associated with research that mainly discusses about absorptive capacity, open innovation and, technology.

Table 7 - Most referenced authors and their respective researches

ORDER	Authors	CIT.	RESEARCH	CIT.
1°	LICHTENTHALER, U.	62	A capability-based framework for open innovation: Complementing absorptive capacity. Journal of Management Studies	12
2°	CHESBROUGH, H.	32	Open Innovation: The New Imperative for Creating and Profiting from Technology, Harvard Business School Press, Boston	13
3°	ARORA, H.	18	Ideas for rent: an overview of markets for technology. Industrial and Corporate Change * Markets for technology and their implications for corporate strategy. Industrial and Corporate Change *	7*
4°	COHEN, W.	16	Absorptive capacity: a new perspective on learning and innovation. Administrative Science Quarterly	12
5°	BIANCHI, M.	13	Organizational modes for open innovation in the bi-pharmaceutical industry: An exploratory analysis. Technovation	3
6°	LANE, P.	13	The Reification of Absorptive Capacity: A Critical Review and Rejuvenation of the Construct', Academy of Management Review	7
7°	GASSMANN, O.	11	Towards a theory of open innovation: three core process archetypes, Proceedings of the R&D Management Conference, Lisbon.	3
8°	VANHAVERBEKE, W.	10	Understanding the advantages of open innovation practices in corporate venturing in terms of real options, Creativity and Innovation Management	2
9°	ZAHRA, S.	10	Absorptive capacity: a review, reconceptualization, and extension, Academy of Management Review	8
10°	WEST, J.	8	Leveraging external sources of innovation: a review of open innovation research, Journal of Product Innovation Management	3

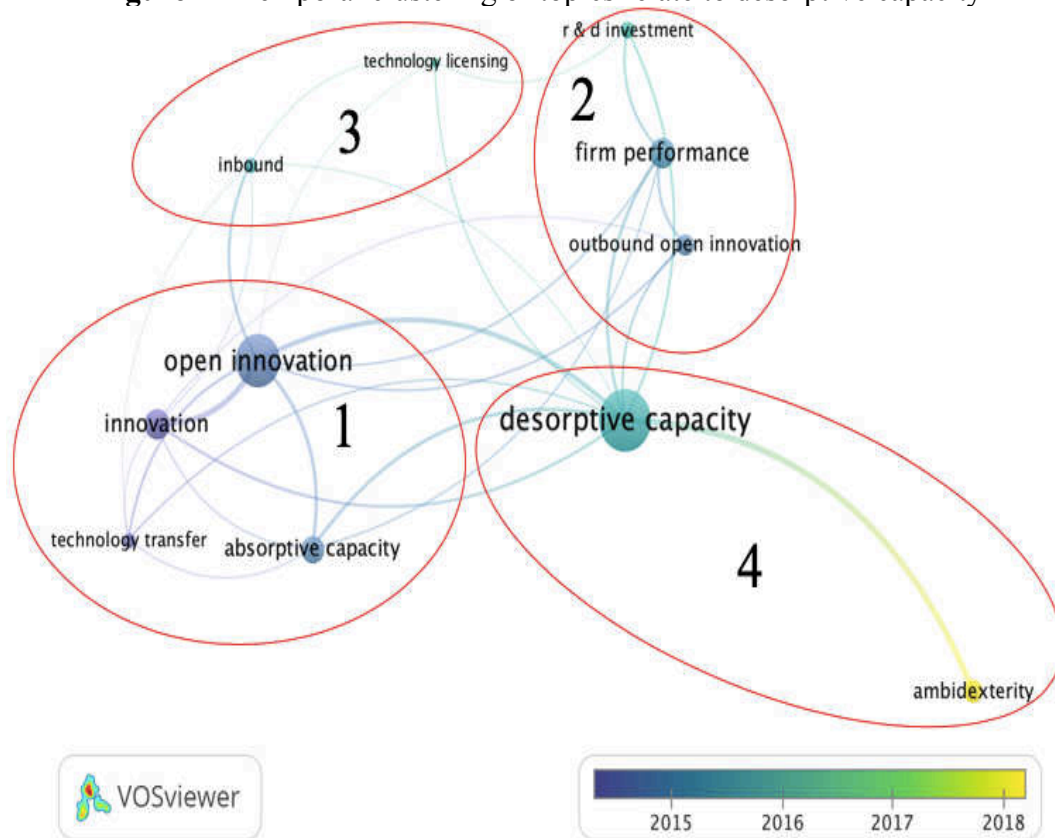
Another analysis consists on the topic's identification associated to the desorptive capacity addressed by the researchers during the reference period of the research. The procedure resulted in 4 clusters, where the transversal component to all is the desorptive capacity. So, the first cluster identified as belonging to the beginning of the studies on desorptive capacity has as its associated topics: open innovation, innovation and, technology transfer. In the second cluster stands out by the research block on: investment in research and development, innovation open to external and, performance.

The third cluster relates research on technology transfer and innovation open to the internal. Even though the time interval between the identified researches in clusters 2 and 3 is relatively

small (on average less than 1 year), it is emphasized that cluster 3 identifies the most recently researched topics.

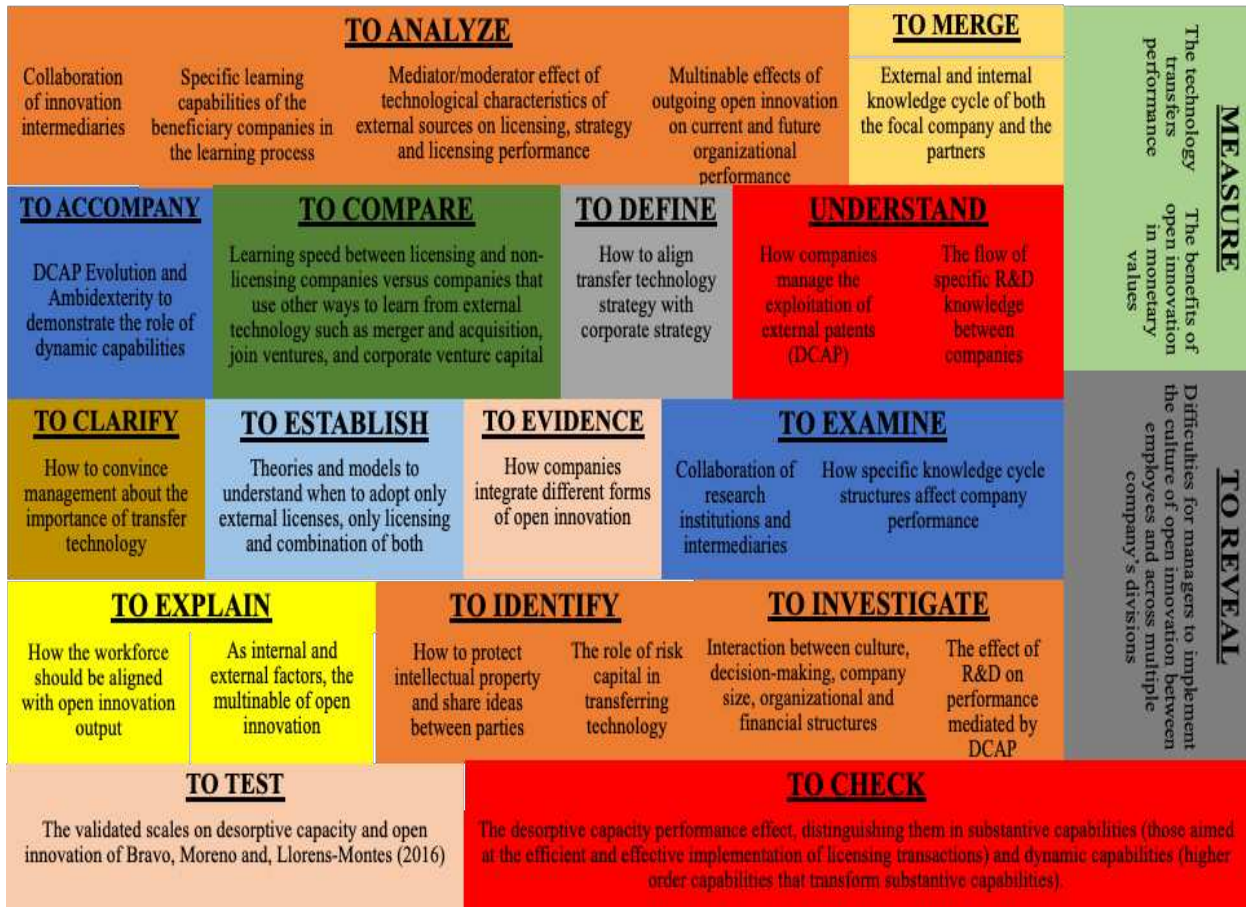
In the fourth cluster, the ambidexterity associated to the desorptive capacity, which, in terms of time, is introduced in the most recent research. This information is relevant for future researches because it presents what has already been researched (in terms of topics) along the time. The clustering topics can be seen in Figure 4. In addition, there is an evolution in terms of research, since after the first cluster the construct desorptive capacity as a construct began to be delineated, although complement the independent absorptive capacity.

Figure 4 - Temporal clustering of topics relate to desorptive capacity



The proposals mapping for future researches related in the analyzed researches was carried out and can be seen in the following. Thus, into 17 verbs and 25 experimental proposals the research was divided. Each proposal detail can be seen in Figure 5. This mapping becomes relevant from the moment it serves as a guide for new researches, a justification for those that are already in progress and/or a reflection process for others based on what has already been pointed out, such as the combination of one proposal with another.

Figure 5 - Future research proposals mapping.



In this background, it is possible to observe that, although, the construct of descriptive capacity is still little explored in scientific publications, it is conquering space as an independent topic and complementing the absorptive capacity in the research agendas of scientists and decision makers. In some European countries, mainly Italy, the research is concentrated, besides the existence of the involvement of companies in the research process. According Herzog's (2011) thoughts the interest of companies in the development of research is congruent and comment on the application to the market of the descriptive capacity, besides Linchtenhaler and Linchtenhaler (2010) when they emphasize that this capacity is associated with the knowledge transfer capability to the business environment (external partners).

The bibliometric tests pointed that the pre-maturity of capacity descriptive constructs' phase. However, there are some researches that have proposed and validated research instruments, specifically Yoo (2011). Following the logic of Lichtenthaler (2010), Yoo (2011) proposed an instrument divided into two stages and four dimensions, such as: a) identification: i) knowledge; ii) planning; and; (b) transfer: (i) transferring; and, (ii) monitoring.

The Lichtenthaler and Lichtenthaler research entitled 'A Capability-Based Framework for Open Innovation: Complementing Absorptive Capacity', is considered seminal. However, it is worth noting that it is not the most referenced.

In addition, in the course of time, a distancing of the descriptive capacity from the absorptive capacity, incorporating other constructs to be contrasted, - e.g., more recently the ambidextrous topic. In this context, several potential objectives were identified for the research agendas based on

the desorptive capacity. So, if from a perspective there is many important doubts involving the real potential from desorptive capacity take into account in e.g., the environment in which the organizations; technology specificities; internationalization process, size of organizations; structure etc, on the other hand there is a range of concerns that can foster research opportunities for its resolutions.

Furthermore to these publications characteristics, there is an agreement on the core of the desorptive capacity concept, understood as that capacity that the company possesses of generating organizational results from the knowledge absorbed by the company (via individuals), as proposed by Linchtenhaler and Linchtenhaler (2010), and the external exploitation of patents reason is directly associated with the type of value that the company is creating (ZIEGLER *et al.*, 2013).

From a second way, there is no uniformity in the transfer of this knowledge (e.g., Knowledge patenting, company stock's sale among others). This lack of standard may be associated with procedural obstacles in organizations to pass on to others the knowledge generated. According to Szulanski (2000) that difficulty experienced in the process of knowledge transfer has received little systematic attention. Thus, when the difficulty is recognized, it is understood as an anomaly and not as the transfer process characteristic.

5. CONCLUSIONS

When analyzing the main aim proposed in the research beginning on analyze the scientific production on desorptive capacity available on the national and international bases, providing a background on what has already been produced and pointing out new possibilities of research, it is concluded that it has been fully achieved. This research brings the result that, although the topic attracts the attention of researchers, especially those already joined to the construct absorptive capacity, it is still in a scientific pre-maturity phase. This subject is highlighted when analyzing the concerns produced by the lack of knowledge on its real predictive power or dependence, in relation to other theoretical constructs and empirical results in the most diverse activities and segments interested in innovative practices.

Some researches developed seem to agree with the beneficial effect of the desorptive capacity on the organizational outcomes, supporting the Denford and Ferris (2018) position, however, as Dell'Anno and Giudice (2015) point out, the capacity of the transferor and of the receiver to absorb new external knowledge depends on its prior knowledge level and related skills. Still, according to the authors, must observe the qualified human capital extent employed in the process, since it will create the culture of the organization, including the capability to establish external links. Therefore, human capital presents itself as a competitive differential for desorptive capacity success.

The research presents some constraints, which do not underestimate from the results found but warning to the findings use with due parsimony. The fact that, although, the bases used are recognized by the importance, many scientific journals that have published papers on desorptive capacity may not be attached and, therefore, did not compose the sample analyzed. Another limitation is associated with the mapping of search agendas. Some proposals are part of published papers for at least 5 years, it is possible that the proposal has already been discussed by another scientist and/or the research is underway.

Considering that the research with the greatest number of mentions was published in a book, it is recommended as future research the extension of the base to exclusively consider books associated with the topic, using the pairs evaluation as a methodological filter. Another proposal

for the research agendas is the integral analysis of the publications to verify the measures of semantic similarity in terms used in the experiments.

6. REFERENCES

- BARCHI, M.; GRECO, M. Negotiation in open innovation: a literature review. **Group Decision and Negotiation**. Vol. 27, No. 3, 343-374, 2018.
- BIANCHI, M.; LEJARRAGA, J. Learning to license technology: the role of experience and workforce's skills in Spanish manufacturing firms. **R&D Management**. Vol. 46, 691-705, 2016.
- BRAUN, A.; MUELLER, E.; ADELHELM, S.; VLADOVA, G. Knowledge flow at the fuzzy front-end of inter-firm R&D collaborations – insights into SMEs in the pharmaceutical industry. **International Journal Entrepreneurship and Innovation Management**. Vol. 15, N. 1/2, 2012.
- BRAVO, M. I. R.; MORENO, A. R.; LLORENS-MONTES, F. J. Supply network-enabled innovations. An analysis based on dependence and complementarity of capabilities. **Supply Chain Management: An International Journal**. Vol. 21, No. 5, 642-660, 2016.
- CARDOSO, R. L.; MEDONÇA NETO, O. R.; RICCIO, E. L.; SAKATA, M. C. G. Pesquisa científica em contabilidade entre 1990 e 2003. *Revista de Administração de Empresas* Vol. 45, No. 2, 34-45, 2005.
- COHEN, W.M.; LEVINTHAL, D.A. Absorptive capacity: A new perspective on learning and innovation. **Administrative science quarterly**. No.35, 128-152, 1990.
- DELL'ANNO, D.; GIUDICE, M. D. Absorptive and desorptive capacity of actors within university-industry relations: does technology transfer matter? **Journal of Innovation and Entrepreneurship**. Vol. 4, No. 3, 1-20, 2015.
- DENFORD, J. S.; FERRISS, A. Absorption, combination, and desorption: knowledge-oriented boundary spanning capacities. **Journal of Knowledge Management**. Vol. 22, No. 7, 1425-1441, 2018.
- HERZOG P. **Innovation and the Open Innovation concept**. In: Open and Closed Innovation. Gabler, 2011.
- HOUSSAIN, M. Open innovation: so far and a way forward. **World Journal of Science, Technology and Sustainable Development**. Vol. 10, N. 1, 30-41, 2013.
- HU, Y.; MCNAMARA, P.; MCLOUGHLIN, D. Outbound open innovation in bio-pharmaceutical out-licensing. **Technovation**. Vol. 35, 46-58, 2015.
- KIM, H.; KIM, Y.; CHO, K. The effects of research and development investment and desorptive capacity on firm performance. **Asian Journal of Technology Innovation**. Vol. 22, N. 2, 252-267, 2014.
- LICHTENTHALER, U. The collaboration of innovation intermediaries and manufacturing firms in the markets for technology. **Journal of Product Innovation Management**. Vol. 30, No. 1, p. 142-158, 2013.
- LICHTENTHALER, U.; LICHTENTHALER, E. Technology transfer across organizational boundaries: absorptive capacity and desorptive capacity. **California Management Review**. Vol. 53, No. 1, p. 154-170, 2010.

LOUSADA, M.; GARCIA, C. L. S.; WOIDA, L. M.; DAL'EVEDOVE, P.; GARCIA, R.; VALENTIM, M. L. P. Produção científica sobre gestão do conhecimento e gestão da informação no âmbito da ciência da informação: uma aplicação da lei de Bradford. **Anales de Documentación**, Vol. 15, No. 2, 1-17, 2012.

RIBEIRO-MARTINS, C.; SILVEIRA-MARTINS, E. Turismo gastronômico: uma pesquisa bibliométrica em bases de dados nacionais e internacionais. **Revista Turismo – Visão e Ação**. Vol. 20, No. 1, p. 184-208, 2018.

SZULANSKI, G. The process of knowledge transfer: a diachronic analysis of stickiness. **Organization Behavior and Human Decision Processes**. Vol. 82, No. 1, 9-27, 2000.

WANG, Y.; ROIJAKKERS, N.; VANHAVERBEKE, W. How fast do Chinese firms learn and catch up? Evidence from patent citations. **Scientometrics**. Vol. 98, 743-761, 2014.

YOO, S. **Development of an instrument to measure absorptive capacity**. Dissertação - Sungkyunkwan University, Suwon, South Korea, p. 53, 2011.

ZAHRA, S. A.; GEORGE, G. Absorptive capacity: A review, reconceptualization, and extension. **Academy of Management Review**, Vol. 27, No. 2, 185-203, 2002.

ZIEGLER, N.; RUETHER, F.; BADER, M. A.; GASSMAN, O. Creating value through external intellectual property commercialization: a absorptive capacity view. **Journal Technology Transfer**. Vol. 38, 930-949, 2013.