



**Doctorado en Administración y Dirección de Empresas
Departamento de Organización de Empresas y Marketing**

PhD THESIS

**"ANÁLISIS DEL IMPACTO MODERADOR DE LA CAPACIDAD DE
ABSORCIÓN EN EL RESULTADO INNOVADOR: EVIDENCIAS
EMPÍRICAS DEL SECTOR SSI DE ARGENTINA"**

**("Analysis of the moderating impact of the Absorptive Capacity in the innovative result:
empirical evidence in Argentina's ICT sector")**

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A los que creen posible ayudar al éxito de pymes y emprendedores.

*A mi padre, que emigrado de España puso su esfuerzo emprendedor
para intentar mejorar su nuevo mundo, la Argentina,
que lo recibió, le dio oportunidades y le permitió conformar una familia.*

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Prologue

Knowledge is the foundation of all advances mankind achieves on a daily basis, and its appropriation is key to manage any improvement. Nevertheless, access to knowledge, whichever it may be, requires conditions and encloses ways and mechanisms that are particularly hard. It is even harder for those who lack the basic resources to ensure a dignified existence, even if that existence does not generate any perspective of growth.

Many peoples and millions of men and women from all over the world suffer from the lack of means to improve their ways of life. These masses depend on the processes of accumulation and the actions of the economic subjects that belong to the systems in which they are immersed. Thus, enterprises, entrepreneurs, actors of intermediate organizations, unions, educators, and the State in its different levels, are the ones who enable them to increase their well-being or decrease it.

There is no other possible formula to improve if it is not through knowledge, except if one can depend on the solidarity of other peoples. Nevertheless, solidarity is, by definition, occasional, discontinuous, and will depend upon factors beyond the control of those that will benefit from it.

What can do be sustained in the long term is that which depends upon the effort and resources of every single individual. Even with solidarity in our minds, it is not enough with “giving a man a fish”, rather with “teaching him how to fish”. This is very clear to those who share access to knowledge and enjoy the possibilities it brings us.

Because of this, it becomes imperative to understand that the solution necessarily lies in the hands of those very few with better or bigger chances of generating positive change. In this sense, those of us who can access knowledge through our university, professional, entrepreneurial, political, or managerial role -or any other dignified and lawful manner- must assume the challenge

of trying to help our fellow citizens by favoring the appropriation of more and better knowledge, knowing that by doing this, we will be creating favorable conditions for the whole.

Sometimes, I believe very few, the transmission of the earned experience helps thinking solutions to what lies ahead. We are tempted of recounting our successes as a way of explaining the way to achieve it, failing to realize that, in an ever-changing environment, it is more likely that most of those factors that allowed us to reach a goal will not be successful in the new context.

In my case, I am tempted of bearing testimony of my father's efforts, a Spanish immigrant that left his country after the 1936-1939 Civil War, and how he was able to triumph in an Argentina that received him at thirty-years-old, and offered him its land as his final resting place at ninety-years-old. In addition to this tale, there exists also the temptation of leaving a trail of the things that, along with my family, were able to make in the field of business, with successes and failures included. In short, I have half a mind of telling, one day, what came to pass.

I put aside that eagerness to reminisce about the past and focused on something entirely different, for which I decided to face this research. I was convinced by several books and the eagerness of many SMEs entrepreneurs in Latin America of looking forward, no matter where I come from or how much or little I have done.

I understood it is not worth it to fulfill that vain desire of telling my own tale, since I believe I will be able to indulge in the future; I am certain I will be able. I am optimistic.

Luckily, I understood that after more than 35 years of professional (as an entrepreneur, university professor and researcher) experience behind me, my obligation was something else: one more effort in trying to extend a particular knowledge that had an impact on the eco-system where I conduct myself, which is none other than that of the internationalization of SMEs in developing economies, particularly in my continent: Latin America.

It is true that the responsibility that a Ph.D. thesis entails at this point in my life may have made things a bit harder, it may have been tedious or reckless. Not for me, who enjoyed the process, but for those who walked with me. I must confess I was pushed by two selfish wishes: one, to show the younger generation, including my children (who some of them are pushing forty) that everything can be done at any point in your life, however life may find us. Two, that it is possible to combine in a rigorous paper the theory with the practice since the topic on which I have focused has been the axis of my work for the last thirty years.

The personal goal of the conducted research must then be understood as an effort that will hopefully help to show those with a more privileged position in society that they are obliged to do, and to make it fast; even when we complain of not having more. We have to look ahead and try to help the majority of those that surround us, who probably don't have the same resources at their disposal.

I am convinced that the aforementioned efforts will never be enough, but the mere satisfaction of knowing we tried may help improve the lives of our siblings, wherever they may be, with whatever resources they may have. I wish to live in a country with the willingness to create richness by sharing the available knowledge and making it accessible to all.

Santa Fe, Argentina, Enero 2022.

Abstract

The research on which this doctoral thesis is based refers to the key conditions that enable SMEs to internationalise and maintain their success in international markets. To this end, it explores the role of inter-organizational networks and the knowledge's absorptive capacity (ACAP) in the innovative process that allows them to build their competitive advantages. The universe of SMEs that promote the development of research is made up of those that can represent as closely as possible the group based in countries with a lower degree of development. That is why the IT and SMEs sector of a country like Argentina was selected.

The bibliometric study in the present investigation based on 1,710 scientific documents produced between 1994 and 2000 according to the Scopus and Web of Science databases, shows that currently there are few authors and few academic networks that investigate the subject, which reveals the existing gap and the contribution of the work to extend the current knowledge.

The empirical evidence collected comes from a study conducted on 189 SMEs working in IT services in Argentina and the results prove the main hypothesis of how ACAP is a positive moderating factor of the innovative effort of firms, even in the case of the connections created by their participation in international networks not having a high correlation. These conclusions are also verified when, with similar methodology, they are applied to the study of a particular SME from the same IT sector in Argentina.

In this way and through the three independent but related studies that give shape to the thesis, it contributes to fill the existing gap in this field of knowledge and to contribute with some suggestions for policymaker managers and future academics lines of research.

Resumen

La investigación en la que se basa la presente tesis doctoral, refiere a las condiciones clave que permiten a las pymes internacionalizarse y mantener su éxito en mercados internacionales. Para ello, explora el papel de las redes inter organizativas y la capacidad de absorción del conocimiento (ACAP) en el proceso innovador que es el que les permite construir sus ventajas competitivas. El universo de las pymes que dan lugar a la investigación, está constituido por aquellas que pueden representar lo más fielmente posible al colectivo radicado en países con menor grado de desarrollo. Por eso se seleccionó el sector TICs de pymes de un país como Argentina.

El estudio bibliométrico de la presente investigación indaga en 1.710 documentos científicos elaborados entre 1994 y 2000 según las bases de datos Scopus y Web of Science, y demuestra que en la actualidad hay pocos autores y pocas redes académicas que investiguen el tema, lo que revela la brecha existente y la contribución del trabajo para ampliar los conocimientos.

La evidencia empírica recolectada proviene de un estudio realizado en 189 pymes del sector TICs de Argentina y los resultados evidencian la principal hipótesis de cómo la ACAP es un factor moderador positivo del esfuerzo innovador de las pymes, incluso en el caso que las relaciones creadas al participar en redes internacionales no hayan teniendo alta correlación. Estas conclusiones también se verifican cuando, con metodología similar, se aplican al estudio de una determinada pyme del mismo sector TICs en Argentina.

A través de tres estudios independientes pero relacionados que dan forma a la tesis, se contribuye a llenar el vacío existente en este campo del conocimiento y se aportan algunas sugerencias para los responsables políticos así como futuras líneas de investigación académicas.

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CHAPTER 1

Introduction

1.1 Grounds for the investigation

In the current structure of countries, either developed or in development, SMEs comprise a key factor in terms of employment contributions, GDP generation, and the development of communities, regions, and individuals with entrepreneurial capacity. By definition, SMEs have fewer resources than big companies, and if they are not able to access international markets, their growth potential is limited to the limits of their own national environments.

The way to salvage the market limitation imposed by the national environment entails having a competitive edge that will allow any given SME to go international. In order to do that, it must be able to recognize available resources, demand conditions of its competition, and even obtainable resources for access to other markets.

All of this forces the SME to be aware of changes and to respond in a quick, effective, and efficient manner to those changes. This attitude can be summed up in a few words: be attentive to innovation, whether through new supply sources of better or newer goods and services, or through specific logistics, or any other possible way. In short: be willing to innovate and to have a permanently innovative attitude.

Innovation is a process that essentially implies novelty and constitutes the “implementation of a new product or service or a significant improvement of it, a new or improved process or marketing method or a new organizational method in the business practices” (Chetty and Stangl, 2010). Radical innovation involves a rotund change of what is there while incremental innovation entails an improvement over an existing basis.

Innovation requires having knowledge at one’s reach, whether they are of one’s own (internal) or from third parties (external) If the latter is true, they have to be available in order to be used. In developing countries, the chance of SMEs developing knowledge of their own that can

then lead to innovation is much less likely than in more developed economies. The first African American recipient of the Nobel in Economic Sciences, Sir William Arthur Lewis, famously defined it by saying “a poor country is poor because it is poor”. With that, he was alluding to the scarcity of product generation (first reason of poverty), which in turn determines an insufficient income, making it impossible to dispose of a surplus destined to savings (second reason) that will finance the investment (third reason), a necessity in order to increase production. This vicious circle of poverty that Lewis so aptly defined, is also limiting for the development of SMEs in their own countries, hence the need to dabble in other markets with greater incomes.

Because of such market limitations and the absence of enough stimuli and investment applied to research and development (R+D) that will generate knowledge of their own for the innovative process, innovation research focuses on the SMEs’ interest in taking advantage of external sources of knowledge through the interaction with the medium, using the concept of open innovation, derived from a theory called close innovation (Chesbrough et al, 2006; Chesbrough, 2003).

The point is to generate value by using external ideas, making them flow to the interior of an enterprise and disseminating them, using them to create new or better products, services, or processes (Hervas et al., 2012; Murovec and Prodan, 2009).

Thus, SMEs are able to develop not just learning processes as they interact with third parties, but they are also benefited through the interpersonal relationships between their own members with the medium (Bertrand and Mol, 2013). In addition to that, they acquire experience of how, with whom, or which strategy to utilize (Love et al., 2014). Because of this, successful SMEs in international markets are permanently trying to gain access to external resources that will

allow them to sustain their innovative process and, with that, their competitiveness (Chiva, et al., 2014; Porter, 1998; Dunning, 1998).

During this process of accessing external knowledge that enables them to sustain their innovative process, SMEs are benefited from the participation in inter-organizational networks. The impact may vary according to the importance of those very networks, the size, and their level of internationalization (Cavusgil and Knight, 2009; Coviello and Munro, 1997, 1995; Guler and Nerkar, 2012; Oviatt and McDougall, 2005). It must be taken into account that the process of internationalization, understood as “an integrated set of strategic decisions and operations that allow the establishment of ever-more stable links with a foreigner through a (conscious and intentional) process of growing international involvement with the enterprise” (Welch and Luostarinen, 1988) is favored and empowered with the participation of SMEs in these type of networks. International entrepreneurship is one of the aforementioned links, understood as the “discovery, enactment, evaluation, and exploitation of business opportunities beyond the limits of a country that generate new goods or services” (Oviatt and McDougall, 2005).

Explanations of the benefits between a reciprocal relationship between innovation and internationalization potential, and between international experience and potentiation of the innovative process can also be found in other authors such as Chetty and Stangl (2010).

Another theoretical effort in that sense is present in the works of Cohen and Levinthal (1990) then extended by Zhara and George (2002) where they link both phenomena with the moderating effect that the absorptive capacity of knowledge (ACAP) produces over them. The ACAP presumes the aptitude of the enterprise in identifying and evaluating external knowledge that can eventually be turned into business opportunities.

This cluster of relationships, 1) the need of accessing external knowledge in order to sustain the innovative process and be competitive; 2) the edge inter-organizational networks generate regarding the ability to access this knowledge; and 3) the positive moderator role the ACAP produces over them, are key matters in which to inquire.

In all of the previous paragraphs there exists the underlying fact that the conditions the environment provides for SMEs can help them take better advantage of the external knowledge (innovation) and achieve a competitive edge in other markets (internationalization).

With this framework in mind, the central purposes of the study are to focus on the valorization of these two elements that favor and push forward the innovative process of the SMEs, to comprehend the role that inter-organizational networks play in the understanding that, the more and better access the SMEs get to innovations, the more and better chances they will have at succeeding in international markets, and ACAP's role as a moderating factor of the aforementioned relationship. As a consequence, the following research question is posed: does the absorptive capacity of knowledge contribute to moderating the positive effects of the inter-organizational networks in the innovative processes of the SMEs of developing countries, particularly Argentinian SMEs from the TICs area, and enhance in such a way their competitiveness to access international markets?

1.2 Research questions and objectives

The elaboration of the research is framed in what constitutes the area of study of international economics, focusing on the analysis of the internationalization process of the SMEs, particularly those that conduct their activities in countries with a lesser degree of development. Accordingly, the questions that lead the inquire are center around three key aspects:

1. Given that innovation is determinant in the process of building the SMEs' competitive advantages in international markets, in which way can those very SMEs access knowledge that enables them to innovate and have internationalization chances?
2. Are inter organizational networks a factor that positively impacts this innovative process that favors internationalization?
3. Is absorptive capacity of knowledge (Cohen and Levinthal, 1990) an element that positively moderates the impact of the networks in the internationalization process of the SMEs?

The inquiry and, consequently, the answer to the posed questions constitute in and of itself a unique process directly linked to exploring the reasons through which the SMEs successfully access the international markets and are able to sustain it as time passes, in spite of having less availability of resources and therefore, less chances, than big enterprises.

It was decided that the research would be conducted in the scope of the cluster of one of the areas that possess the most dynamism belonging to a market with a lesser degree of development in which the conditions of the environment tend to be less favorable for success. Hence, the Argentinian ICT sector was selected, a sector which significantly represents the exposed conditions. Furthermore, this area of study disposes of enough empirical evidence that allows us to suppose a wide and interesting scope of academic discussion of the obtained results, with the possibility of extrapolating them to other markets with similar origins.

1.3 Contribution to knowledge

The studies carried out allow greater certainty about the influence of inter-organizational networks and ACAP in the construction of competitive advantages of SMEs and in what way they favor their internationalization process. It becomes evident from the works developed that these

studies are of recent date, of increasing production and concentrated in few countries and in few academic networks that address them, standing out precisely among them the Spanish network of inter-institutional profile and that outlines growing relations with Latin America where these studies are also gaining significant dynamism (Mexico, Argentina, Uruguay, Chile). The award in 2015 of a precisely Latin American work during the 59th. ICSB World Conference in Dubai (Arechavala, et. al, 2015) and the publication of two of the three articles of this thesis in Latin American journals (Agramunt & Berbel-,Pineda, 2018 and Agramunt, et. al, 2020) are proof of them and their contribution to the development of the topic.

The evidence of the positive impact of inter-organizational networks in the process of construction of innovations by SMEs and the moderating effect of ACAP in said process, allow it not only to be disseminated in academic areas and in business areas to be internalized with the purpose of winning markets, but can potentially be used as key factors for the development of active policies by States (national or sub-national) to promote and support the growth of their SMEs.

Although the ICT sector may not entirely represent the universe of SMEs since many are industrial, others commercial and others of different services, it is also true that the ICT sector crosses all of them and is one of the sectors with the greatest dynamism and growth. On the other hand, the SMEs in the sector present more or less common characteristics, regardless of whether they are developed in any country, which is why they constitute global companies and their behavior can be considered homogeneous. Obviously, the factor endowment that each one has will give it a greater or lesser possibility of successfully internationalizing, but the environmental conditions will remain constant for all of them. Therefore, it is possible to contribute with these studies to a general discussion that encompasses the understanding of all SMEs.

1.4 Structure of the thesis

The thesis is structured with three independent studies as its core, which are presented in chapters 2, 3, and 4. Together, they provide answers to the inquiries that motivate the research. Although each study has its own objective and methodology, they constitute in themselves an appropriate and related unit or set that allows drawing conclusions that contribute to a common objective: to interpret the effects of inter-organizational networks in the construction of competitive advantages of SMEs. in the ICT sector to participate in international markets and analyze the moderating effect of knowledge absorption capacity (ACAP).

1.4.1 Study 1

The first study addresses the evidence about the international competitiveness of Small and Medium Enterprises having a close relationship with their absorptive capacity and internationalization networking, to find out the main trends in this field of knowledge. This is a bibliometric analysis of the status of the existing research in the field and helps identify research gaps. The study was done through a review of 1.710 documents published about this relationship from the Scopus and Web of Science databases (1994–2018), using a processing software application that employs two combinations of terms associated with Boolean operators which were taken into account in order to optimize the accuracy of the search and to facilitate large data capture. The results show that these studies are in a period of high production and concentrated in a few countries and researchers' networks in the United States, the People's Republic of China, and some European countries.

1.4.2 Study 2

The second study analyzes the positive moderating role of absorptive capacity (ACAP) in the innovative outcomes of the firms. It focuses on ACAP as a moderating variable of the innovative efforts that firms develop or have the chance of incorporating from the outside and not

just as an antecedent of the results of the innovation. The empirical evidence collected comes from a study conducted on 189 SMEs working in ICT services in Argentina and the results prove the main hypothesis of how ACAP is a positive moderating factor of the innovative effort of firms, even in the case of the connections created by their participation in international networks not having a high correlation.

1.4.3 Study 3

In the third study, a questionnaire similar to the one used for the development of Study 2 was applied, but in this instance, it was focused on a particular SME belonging to the ICT sector in Argentina. The evidence of the case shows how the positive influence of the relationship between the participation in inter-organizational networks and the moderating effect of the ACAP is maintained even when the SME must change or modify its business plan. Innovation, the key to building a valid competitive advantage in international markets, is sustained and is valid when the SME must modify its business approach due to exhaustion of the current model, changes in the environment, or internal changes.

1.5 Methodology

In each one of the three studies that form this thesis, besides offering the theoretical framework of references and displaying the particular conclusions reached in every one of them, the used methodology is explained and justified, the statistical tools utilized in each case are specified, and the processed data is detailed.

Even though each case utilizes quantitative methodologies, each of them answers to different usage criteria. In the first study, the bibliometric resource method was used. This is a currently widely utilized method in many areas that shape the social sciences (Baier-Fuentes, et.

Al, 2019; Sanguankaew and Vathanophas Ractham, 2019). It is grounded in the need of establishing relationships between different constructs like absorptive capacity, networks, and internationalization in order to analyze the relevance of the topic at hand and the scientific production around it.

Bibliometrics is used, in this opportunity, as a quantitative evaluation of publications and quotes (Aria and Cuccurullo, 2017), renowned authors (Danvila del Valle, et. Al, 2019; Cunill, et. Al, 2019), maturity (Sharma, 2019; Ansari, et. Al, 2019), and tendencies and future agenda (Matarneh, et.al, 2019). All of this data was taken from over 1,700 documents published between 1994 and 2000 in two significant databases, Scopus and Web Science. were surveyed

Both the second and third studies are based on a quantitative approach to Argentinian ICT enterprises. Both are field research whose goal is to collect information on businesses or areas, and the used tool was a structured questionnaire supported by a personal interview. In the second study, 189 SMEs were included and a grand total of 944 variables were collected. This data was processed by the IBM SPSS Statistics 23.0 software and then the correlation coefficient Pearson was applied to reach the correlation analysis.

The third study made use of a similar questionnaire this time exclusively applied to the case of the enterprise of interest, which was also complemented by personal interviews with the entrepreneurs.

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CHAPTER 2

Review on the Relationship of Absorptive Capacity with Inter-Organizational Networks and the Internationalization Process

2.1 Introduction

During the current century, the business's environment shows CEOs, entrepreneurs, researchers, and even politicians that firm's international competitiveness depends basically on innovation. This is why it is obvious that the focus is placed on how to help firms and in consequence to increase national growth. While SMEs engaged in international markets tend to be more productive and innovative than those which are not, they can further improve their performance through internationalization. In most countries, SMEs account for a significant proportion of employment and they are the ones which need more attention. It is common for the following question to be present into the mind of those actors: which is the best way to bring innovation to firms, especially those which have less resources, SMEs? There are many theories about the innovation process and the main situations and activities that could reach that goal. One of these analyzes the positive moderating effect that the inter-organizational networks and the absorptive capacity (ACAP) have on the innovation process. For SMEs, these networks are critical in order to give them the chance to be competitive. On the contrary, not all firms have the same ability to process this new data and transform knowledge into business opportunities. The capability of having this ability was described by Cohen and Levinthal (1990) years ago and named as absorptive capacity. "This concept exhibits a significant importance to analyze the business ability of seizing the external knowledge, combining it with its own domains and generating a dynamic learning and feedback that favors the innovative process and subsequently the maintenance of competitive advantages". So, if SMEs want to be competitive, the key factors in the innovation process needed for this are (a) the inter-organizational networks and (b) ACAP.

In this vein, the concept of sustainability is deemed as a relevant concept in order to achieve competitive advantage. Some authors, Fichman (2004) and Wink (2004), analyzed the sustainability concept with inter-organizational networks and ACAP although it was not until

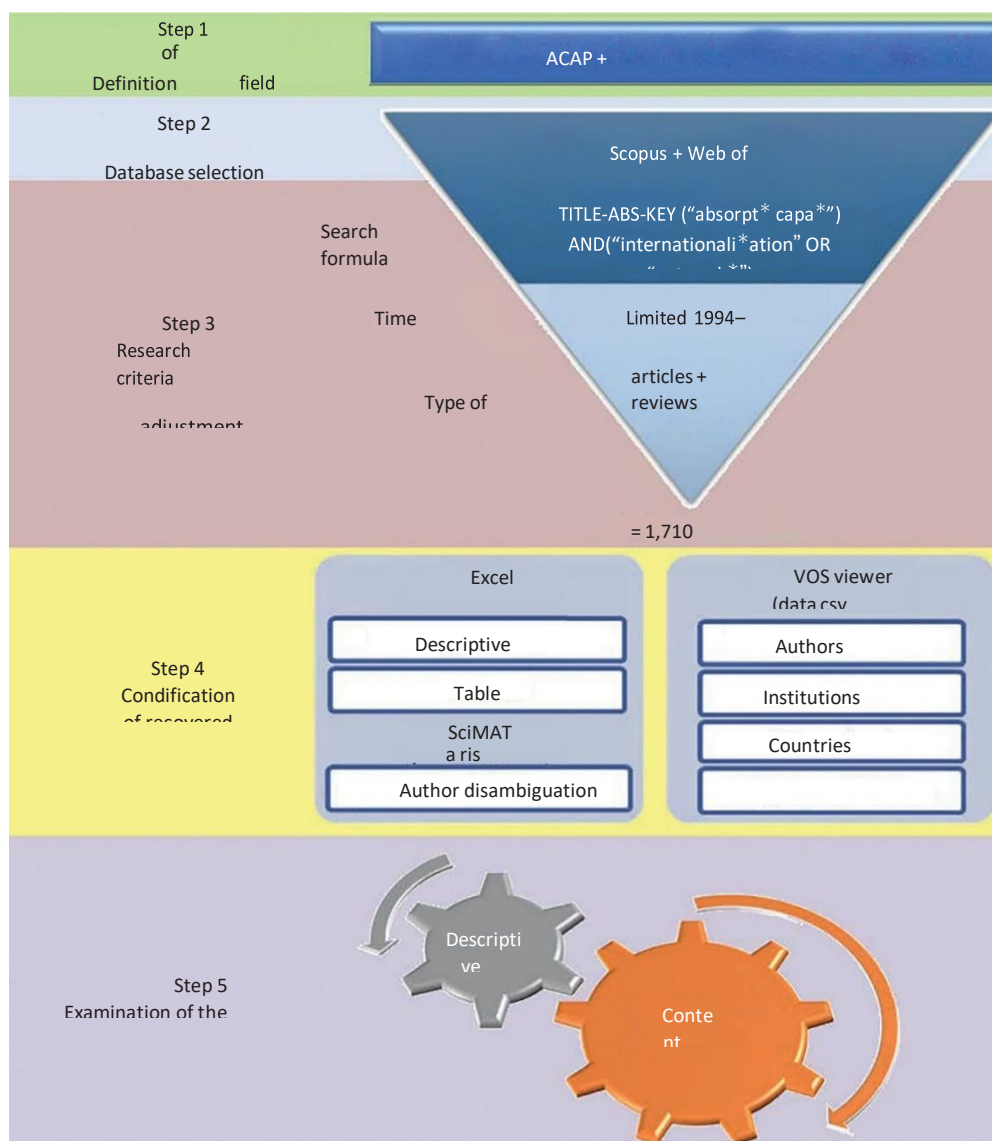
Van Wijk et al.'s (2008) study that examine how knowledge, organization, and network level could impact on organizational knowledge and transform into sustainable competitive advantage. Subsequent research has emphasized the importance of corporate sustainability to achieve competitive advantage. Especially for SMEs, the difficulties in international markets make the analysis of the impact of sustainable goals necessary. In such a way, the report by the World Trade Organization (2016) is an attempt to address with sustainable development goals included in Agenda 2030.

Although the research field is deemed as interesting and flourishing due to the existing volume of the literature, there are few bibliometric studies that have analyzed ACAP as a knowledge area. While relatively recent studies based on the results of bibliographic analysis concerning ACAP in the management context exist, some others assess if there is a relationship between open innovation and ACAP or analyze the role of ACAP in the relationship between strategic alliance portfolios and innovation performance, and none of them has addressed ACAP's relationship in networking and internationalization. The main motivation of this paper is to cover the current gap regarding ACAP's relationship in networking and internationalization so as to help researchers to identify future research trends.

For the reason stated above, the purpose in this study is to show a qualitative and quantitative examination of the dynamics of global research in the last 25 years (from 1994 to 2018) to determine the current state of scientific production about "ACAP's relationship with networks and internationalization in the process to access external knowledge. To achieve this goal, bibliometric methods were employed. As Capobianco-Uriarte et al. (2019) mentioned, bibliometric techniques allow the identification of the main elements of a research topic. In addition, it enables to detect the most productive agents in the research field.

Therefore, the contributions of this study are twofold. First, identifies the main trends in ACAP research revealing the evolution of the field. Second, the link of the main concept to networking-internationalization issues is highlighted, suggesting future research challenges. In the next section, a theoretical view of the main approaches of the concept of ACAP is presented. After that, the bibliometric methodology used is explained. Subsequently, the main results are shown and analyzed. Finally, the conclusion section is presented.

Figure 1



2.2. Materials and methods

Bibliometrics is a quantitative evaluation of publication and citation data, now used in almost all scientific fields to evaluate growth, maturity, leading authors, conceptual and intellectual maps, and a scientific community's trends and future agenda. In social sciences, a large number of bibliometric studies related to different areas of knowledge, such as economics, finance, management, and business, among others, have been conducted. It is also used in research performance evaluation, especially in university and government labs and also by policymakers, research directors and administrators, information specialists and librarians, and scholars themselves. The results of a bibliometric analysis allow the analysis of past research and the detection of future trends of research. Bibliometric analyses require a bibliometric data source.

As stated above, this research adopts the bibliometric analysis technique as the method to conduct this review. As in bibliometric analysis carried out by Terán-Yépez et al. (2020), this paper follows five steps: (1) definition of the field of study, (2) database selection, (3) research criteria adjustment, (4) codification of recovered material, and (5) examination of the information (Figure 1). The results of bibliometric analysis may vary depending on the database used. Web of Science, produced by Clarivate Analytics, and Scopus, created by Elsevier, are the two most used bibliometric data sources, together with Google Scholar by Microsoft. Harzing and Alakangas (2016) suggest that all three databases provide sufficient stability of coverage to be used across five major disciplines (Humanities, Social Sciences, Engineering, Sciences, and Life Sciences) although Martín-Martín et al. (2018) conclude that, in all areas. Google Scholar citation data are essentially a superset of Web of Science and Scopus, with substantial extra coverage. However, Google Scholar lacks transparency, suffers from data quality problems, and is very difficult to use for large-scale analysis. For these reasons, the two most commonly used bibliometric data sources, Web of Science and Scopus, will be used in this study. In this

analysis, a search formula was used with two combinations of terms connected together with Boolean operators included in order to optimize the accuracy of the search and to facilitate large data capture, TITLE-ABS-KEY (“absorpt*capa*”) AND (“internationalization” OR “network*”) to extend the concept of ACAP in the context of internationalization. The search was limited in the time period encompassing 1994–2018 years, due to the fact that the first year of the search coincides with the contribution by Cohen and Levinthal (1990), generally accepted as the founding paper, where ACAP is defined as “the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends.” The search in both databases (Scopus + Web of science) was undertaken in July 2019.

The selection criteria for the scientific document sample to be analyzed through the proposed bibliometric analysis follow the guidelines of Capobianco-Uriarte et al. (2019). Only scientific articles and reviews, including open access and non-open access documents, were taken into account in the search. Data are retrieved from two major databases, Scopus and Web of Science. Once the data were treated, the analysis was carried out using VOSviewer, which is a powerful tool that enables scientific maps to be illustrated, visualized, and discovered. Finally, the results are shown by descriptive analysis and content analysis. First, the descriptive analysis shows the most productive agents in the research field, authors, institutions, or countries. And then, the content analysis in a temporal evolution of the fields considered was studied in terms of timelines for the keywords and keywords networks.

VOSviewer software was selected for the creation of bibliometric networks and their visualization as bibliometric maps of the topic. VOSviewer is a freely accessible software for academic nonprofit use, offering an easy and fast analysis tool, specifically for authors, institutions, countries, coauthorship, and keywords cooccurrence networks, and combining

visualization and clustering techniques. Although VOSviewer can be used to construct and visualize bibliometric maps of co-occurrence data, the software tool does not allow any co-occurrence matrix from the bibliometric data to be extracted and built. This software builds a similarity matrix from a co-occurrence matrix using a similarity measure known as the association strength. Furthermore, the software tool has no preprocessing modules to prepare the data for later analysis (as duplicate items detection, time slicing, and data and network reduction). Thus, an external process is needed. Moreover, VOSviewer mapping technique builds only on two-dimensional map, in which the elements are located. In such a way, the distance between any pair of items reflects their similarity as accurately as possible, while other software features 3D networks (as Gephi or Cyvision). Despite the limitations presented by VOSviewer, this visualization software has been used to construct scientific maps from network-based data due to its powerful user graphic interface, which allows to examine the generated maps easily, being used for a diverse range of disciplines and scientific fields.

2.3 Results and Discussion

2.3.1 Descriptive analysis

Though the concept of ACAP was introduced in 1990 by Cohen and Levinthal, belonging to the Carnegie Mellon University and the University of Pennsylvania, respectively, Carlsson and Jacobsson (1994) published the first article linking ACAP with topics of internationalization and network

Table 1
Summary of data

Data	Absorptive capacity and networking (internationalization research)
Number of articles	1,71
Number of citations	36,879
Number of journals	553
Number of authors	3,297
Number of institutions	783
Number of countries	64
Study time (data sources)	1994–2018 (Scopus and Web of science)

Source: own elaboration with Web of Science and Scopus data (2018).

formation. From 1994 to now, a large number of articles have been published in the Web of Science and Scopus, a total of 1,710. Linking ACAP with internationalization and network formation has been addressed by 3,297 authors, whose works have been published in 553 academic journals indexed in databases considered between 1994 and 2018 (Table 1).

Table 2
Main characteristics of the data used

Year	A	C	C/A	AU	AUA	JA	COA	IA
1994	1	37	37.00	2	2	1	1	1
1995	1	35	35.00	3	3	1	1	1
1996	1	3,539	3,539.00	1	1	1	1	1
1997	0	0	0.00	0	0	0	0	0
1998	1	543	543.00	2	2	1	1	1
1999	3	463	154.33	6	7	3	2	2
2000	4	582	145.50	6	7	4	4	4
2001	10	3,697	369.70	23	24	7	9	10
2002	7	1,599	228.43	16	17	7	4	7
2003	14	3,266	233.29	22	25	13	7	14
2004	17	3,682	216.59	34	38	13	8	16
2005	32	3,834	119.81	72	68	29	14	27
2006	35	7,214	206.11	74	70	31	16	32
2007	31	2,619	84.48	63	63	23	15	30
2009	67	3,823	57.06	156	155	45	20	61
2010	78	3,689	47.29	184	171	60	20	72
2011	118	2,876	24.37	284	271	85	28	97
2012	136	4,152	30.53	340	326	91	26	112
2013	126	2,500	19.84	316	307	92	29	113
2014	160	3,039	18.99	409	391	101	35	146
2015	155	1,989	12.83	397	376	106	31	137
2016	205	1,543	7.53	528	510	135	41	175
2017	200	882	4.41	541	526	137	40	172
2018	243	377	1.55	670	638	149	46	204
	1,710	60,338	35.29					

Source: own elaboration with Web of Science and Scopus data bib73(2018). A, total number of articles published per year; C, number of article citations per year; C/A, average citation per article; AU, number of authors per year; AUA, number of authors that published at least 1 article in a specific year; JA, number of journals that published at least 1 article in a specific year; COA, number of countries that published at least 1 article in a specific year; IA, number of institutions that published at least 1 article in a specific year.

Carlsson and Jacobsson (1994), who related ACAP with topics of network formation, belong to Case Western Reserve University (United States) and Chalmers University of Technology (Sweden), respectively. In addition to this, these authors analyzed networks of agents interacting in a specific area of technology (the Swedish automotive sector) under a particular institutional infrastructure and confirmed that this constitutes a useful unit of analysis not only for innovation and diffusion studies but also for work related to technology policy. Although the authors did not directly address the issue of internationalization, they supported the early identification of important developments and increasing the economy's ACAP as being important aspects of public policy.

There were few publications during the first 5 years (1994–1998), but one of them has stood out for the relevant number of citations obtained (Table 2).

Szulansky's (1996) study evidences that the major

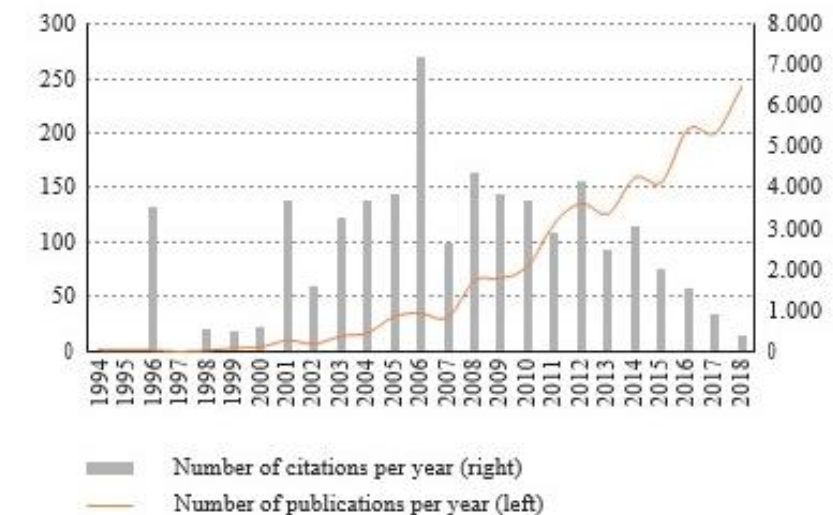


FIGURE 2: Number of citations and publications per year. (1994–2018). Source: own elaboration with Web of Science and Scopus data (2018).

barriers to internal knowledge transfer are knowledge-related factors such as the recipient's lack of absorptive capacity, causal ambiguity, and an arduous relationship between the source and the recipient, contrary to conventional wisdom that primarily blames motivational factors. In the following 5 years (1999–2004), the subject took on a greater dimension as to the volume of publications, though this remained at a low level, not surpassing 38 publications annually. At the beginning of this period, in 1999, the first article appeared which related ACAP with topics of firm

internationalization. In this study, Meyer-Krahmer and Reger (1999) highlighted the changes in the innovation strategies of large multinational companies, included in the agenda of technology policy in Europe, a greater emphasis on collaboration and mobility outside Europe, strengthening the attractiveness of the European Union for foreign investment in R&D and the absorption capacity of R&D organizations in Europe.

In 2011, there were more than 100 annual publications. In 2016, the production duplicated this with more than 200 publications. The evolution of the scientific production in ACAP related with internationalization and network formation shows an exponential growth from its beginnings in 1994 (Figure 2). The number of journals interested in these topics increases from 2011 and 2012. This increase is significant, being an average of 100 different journals per year which publish on this matter. A greater number of authors (681) and of journals (149) interested in it is noted in the last year (2018). Table 1 indicates a significant number of countries and institutions participating in indexed publications on these topics although initially the average for each one of them is low (less than 27 articles per country and slightly more than 2 per institution). These figures are notably modified if we only consider the last 5 years of production (2014–2018) as 56% of the total of articles of the 24-year period are concentrated in these five years (Table 2). The number of authors who have addressed the topic of ACAP in internationalization and network formation has increased polynomially since 2004, having a maximum of annual production in 2011, with the participation of more than 400 authors who published at least one article (Figure 3). There were 681 authors in 2018. The authorship average in the articles published on this topic is between 2 and 3 authors per article (2.63). There is an average concentration of the productivity as to the number of authors who publish. The distribution of frequency of authors according to the number of articles published is the following: 15.20% of the articles are

produced by a sole author, 34.04% by 2 authors, 32.57% by 3 authors, and the remaining 18.19% by four or more authors.

The journals which published scientific works related with the topic analyzed have also constantly grown, surpassing a hundred in 2011 and reaching 149 in 2018. The distribution of the articles published in the journals indexed in Scopus and Web of Science is very atomized, as there are many journals which publish on the subject and most

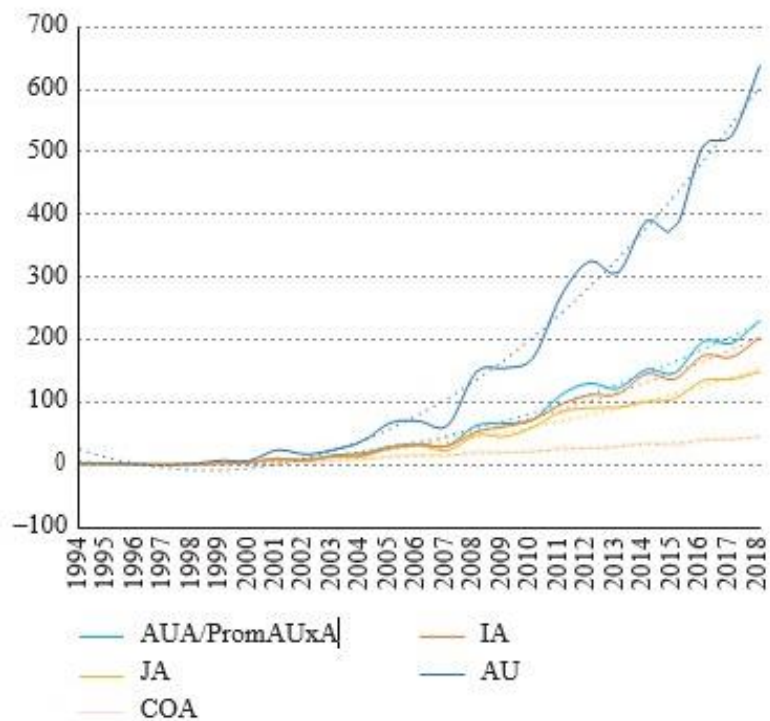


Figure 3: Number of authors, institutions, countries, and journals per year (1994–2018). Source: own elaboration with Web of Science and Scopus data (2018).

present a low average of articles published. Taking into account that the first 10 journals in the ranking of volume of articles published (Table 3) does not reach 19% of the total (325 out of 1711), each one of them with an average of 32.5 articles over 24 years and there being a reasonably low dispersion around the average (45 being the maximum number of articles published and 24 the minimum).

Table 3
Top ten most productive journals

Journal	A	C	C/A	1st A	Last A	h index
Research Policy	45	3842	85.4	1999	2018	26
International Business Review	39	1068	27.4	2005	2018	18
Journal of Knowledge Management	38	804	21.2	2009	2018	17
International Journal of Technology Management	38	307	8.08	2007	2018	11
Technological Forecasting and Social Change	30	311	10.4	2004	2018	12
Technology Analysis and Strategic Management	30	286	9.53	2006	2018	10
Strategic Management Journal	28	7656	273	1996	2018	20
Journal of Business Research	27	684	25.3	2007	2018	14
Industry and Innovation	26	807	31	2008	2018	10
Regional Studies	24	988	41.2	2004	2018	14

Source: own elaboration with Web of Science and Scopus data (2018). A, total number of articles; C, number of citations for all articles; C/A, average citation per article; 1st A, year of the first published article; Last A, year of the last published article.

Table 4
The most cited articles

Title	Author/s	Journal	C	Year	C/A
Exploring internal stickiness: impediments to the transfer of best practice within the firm	Szulanski G.	Strategic Management Journal	3,539	1996	160.9
Clusters and knowledge: local buzz, global pipelines and the process of knowledge creation	Bathelt H. Malmberg A. Maskell P.	Progress in Human Geography	1,849	2004	252.8
Knowledge transfer in intraorganizational networks: effects of network position and absorptive capacity on business unit innovation and performance	Tsai W. P.	Academy of Management Journal	1,804	2001	108.8
Network structure and knowledge transfer: the effects of cohesion and range	Reagans R. McEvily B.	Administrative Science Quarterly	1,468	2003	120.3
Social capital, knowledge acquisition, and knowledge exploitation in young technology-based firms	Yli-Renko H. Autio E. Sapienza H. J.	Strategic Management Journal	1,222	2001	86.4

Source: own elaboration with Web of Science and Scopus data bib73 (2018).

All these publications maintain their presence in the last year covered (2018), indicating a current interest in the topic. Research Policy and International Business Review stand out among the journals with a greater volume of publications on this topic. Both are published by Elsevier. The former is a multidisciplinary social science journal. The latter is a specialized journal. International Business Review provides a forum to share the latest developments and advances in

the knowledge and practice of international business. However, *Journal of Knowledge Management* is published by Emerald and is also a specialized journal, dedicated to all aspects of managing knowledge in organizations. It is highlighted that *Strategic Management Journal*, although it is neither the most productive journal nor the most cited within the top ten journals group, has published 2 of the 5 most cited articles on the topic (Table 4).

Spanish researchers stand out in the ten most productive authors in ACAP related with internationalization and network formation. The most cited authors are American and Dutch researchers. Molina-Morales F. X., of the University Jaume I, is the author who has the greatest quantity of articles published and Lavie D., of the University Texas, is the most cited author (Table 5). It is not only interesting to analyze the productivity of the researchers but also the collaboration networks, which are both intra institutional and interinstitutional and intranational and international. For these purposes, the first author of each of the works published is considered and the author Williams C. is excluded for being the only U.S. reference in a Chinese network and simultaneously representing five different institutions around the world; it not being possible to identify if this reference corresponds to the same person who is affiliated to different institutions or to different people with the same name. Additionally, and there not being another North American node in this Chinese network, this reference is excluded given its scant relevance in the total universe. Taking into account 10 or more scientific documents in common, it is possible to detect the following five scientific networks of different collaborations (Table 6). Figure 4 shows the cumulative time-varying collaboration networks between authors and research groups during the period 1994–2018. This information is useful not only for the visualization of the evolution of scientific production of the networks but also for the changes in the configuration of these collaborative networks.

Table 5

Ten most productive authors

Authors	A	C	C/A	1 st A	Last A	h index	Country	Affiliation
Molina-Morales F. X.	23	516	22.43	2005	2018	11	Spain	University Jaume I
Belso-Martinez J. A.	11	54	4.91	2011	2018	5	Spain	University Miguel Hernandez
Lavie D.	10	1,876	187.60	2006	2016	6	United States	University Texas
Duysters G.	10	1,124	112.40	2006	2018	6	Netherlands	Tilburg University
Lyles M. A.	10	920	92.00	2008	2016	5	United States	Indiana University
Pedersen T.	8	349	43.63	2008	2015	5	Denmark	Centre of Strategic Management and Globalization
Parra-Requena G.	8	94	11.75	2010	2018	4	Spain	University Castilla La Mancha
Garcia-Villaverde P. M.	8	93	11.63	2010	2018	4	Spain	University Castilla La Mancha
Diez-Vial I.	8	86	10.75	2014	2018	4	Spain	Complutense University of Madrid
Boschma R.	7	850	121.43	2007	2015	6	Netherlands	Utrecht University

Source: elaboration with Web of Science and Scopus data (2018). A, total number of articles; C, number of citations for all articles; C/A, average citation per article; 1st A, year of the first published article; last A, year of the last published article.

Table 6

Main intranational and international scientific networks

Intranational networks		International networks	
(i)	Swedish	(i)	American (USA) – European – Asian
(ii)	Spanish	(ii)	American (Canadian) - Asian
(iii)	Chinese		
(iv)	British		

Source: own elaboration.

The relevance of the study in the time-varying collaboration networks is highlighted in the work by Viana et al. (2013), who claimed the importance of the analysis of the moment in which a network emerges and the identification of the characteristics of the collaborative patterns. In this vein, this analysis allows the stability of the activity of networks.

Figure 4a

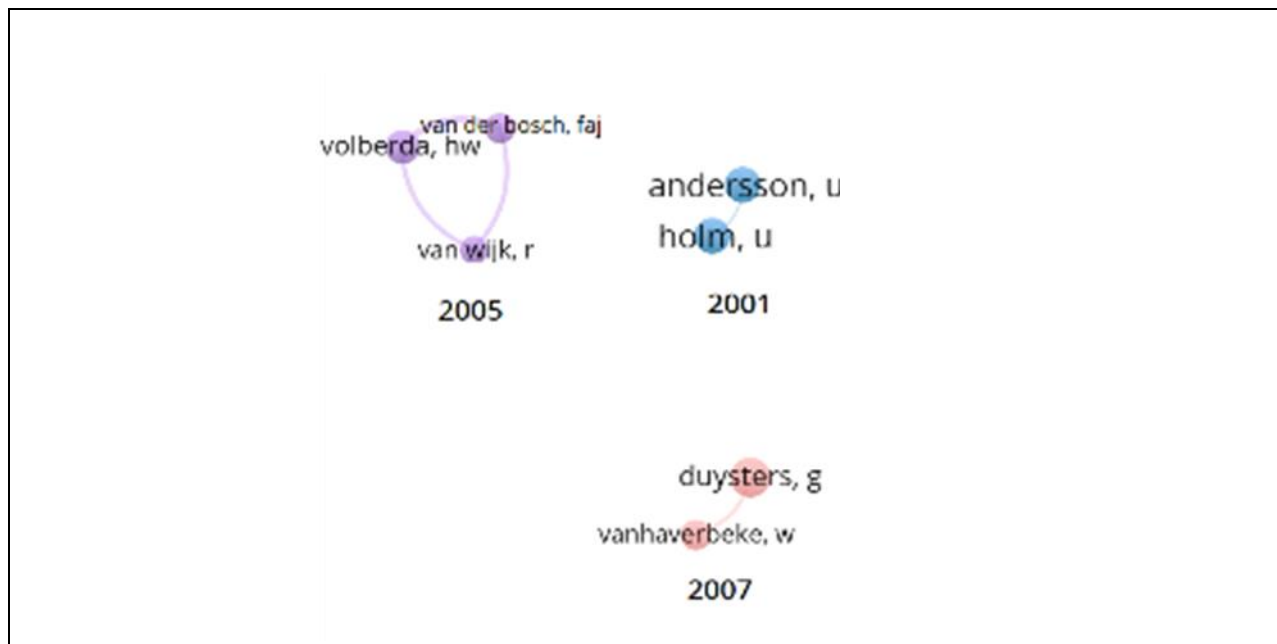


Figure 4b

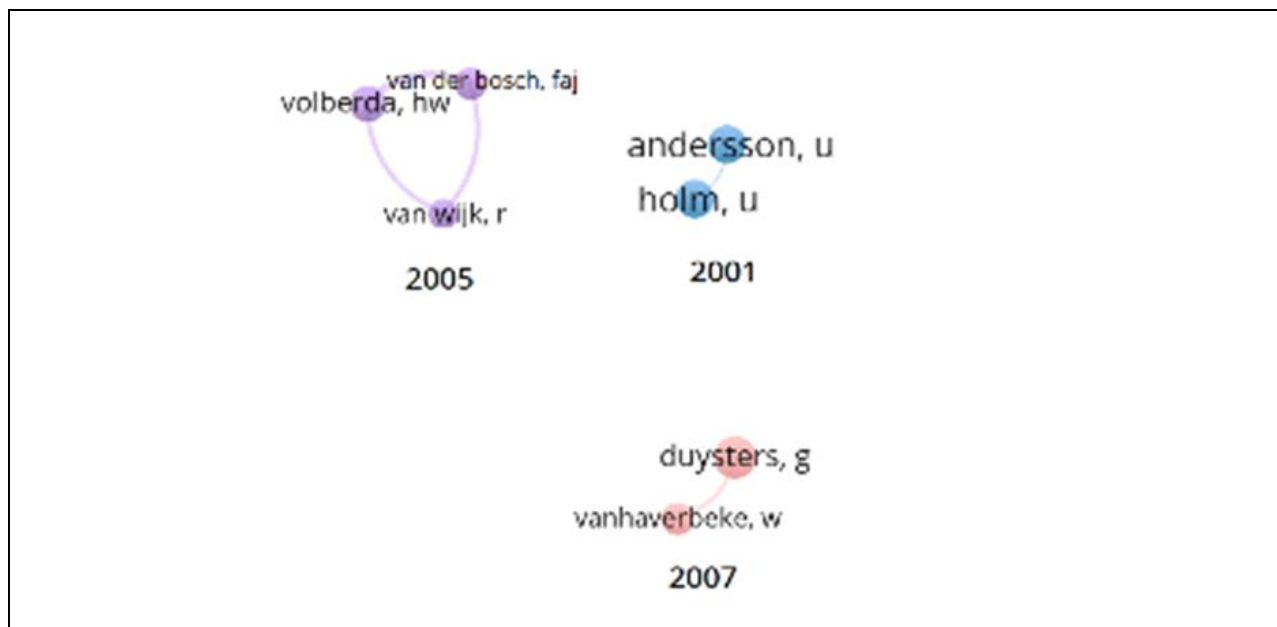


Figure 4c

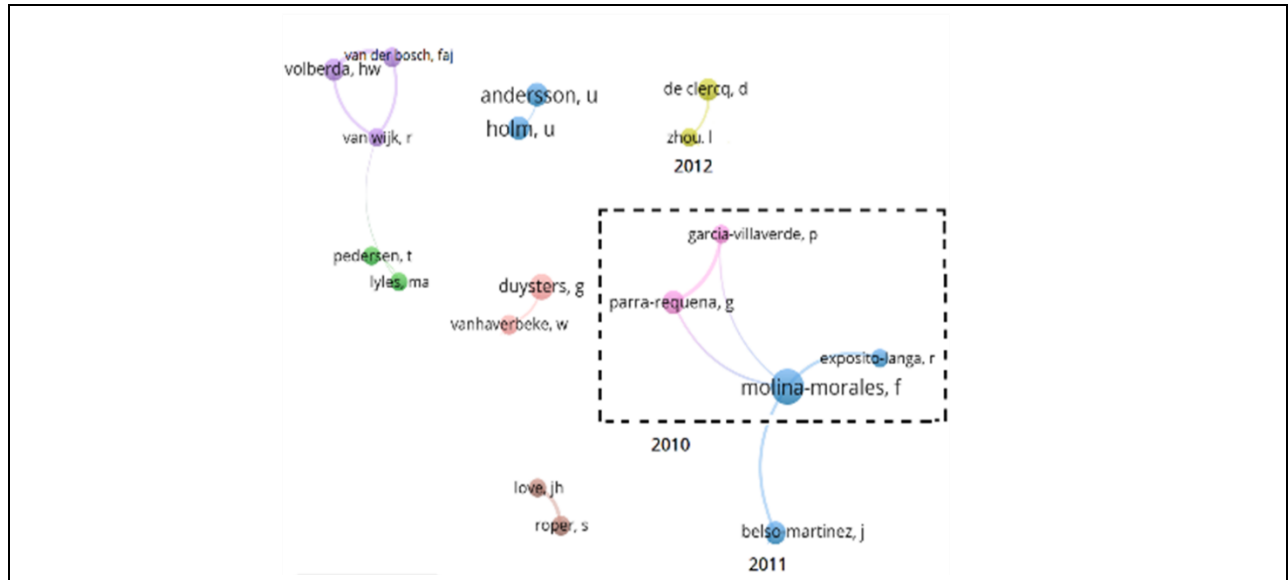


Figure 4d

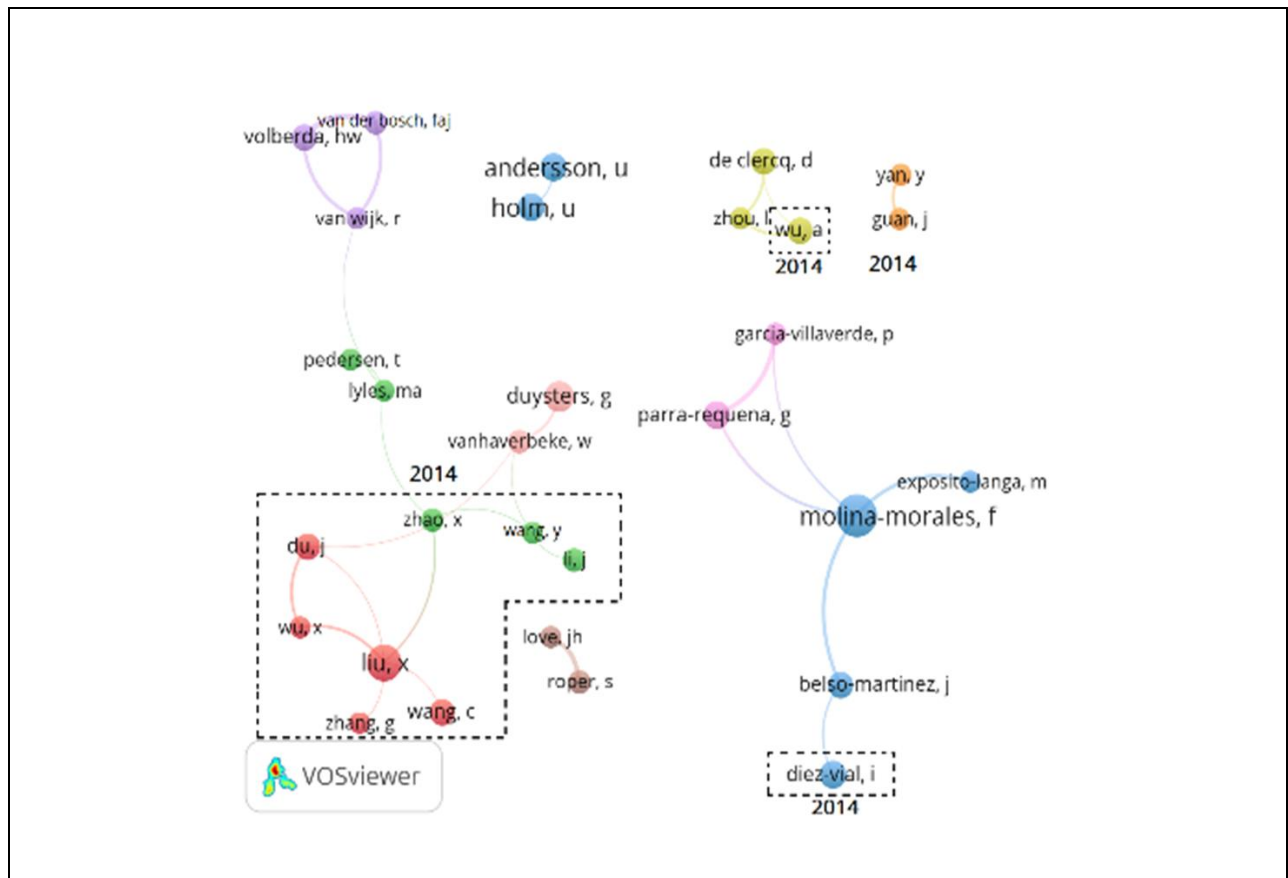


Figure 4(a) shows that the first collaborative network is identified in 2001, encompassing Swedish authors, namely, Andersson U. and Holm U. from University Uppsala. This network worked until 2002.

The second network is from the Netherlands, where Volberda H. W., Van den Bosch F. A. J., and Van Wijk, et al. are the authors belonging to Erasmus University, their first publication was in 2005, and they continued publishing until 2012.

The third network is also from the Netherlands, created in 2007 by Duysters G. and Van Haverbeke W., both from ECIS-Eindhoven University of Technology, although a second affiliation of Van Haverbeke W. was detected in Hasselt University (Belgium). They continued working until 2012.

The scientific network with the greatest scientific productivity is national and interinstitutional (Table 6), located in Spain, and led by the most productive author. This network emerges in 2011 between Molina-Morales F. X. (University Jaume I), Exposito-Langa M. (University Politech, Valencia), and Parra-Requena G. and Garcia-Villaverde P. (both University Castilla La Mancha) (Figure 4(c)). Later, two authors, Belso-Martinez J. (University Miguel Hernandez) and Diez-Vial I. (University Complutense Madrid), were incorporated in this network, in 2011 and 2014, respectively (Figures 4(c) and 4(d)). Within the other transnational networks, it is under-scored that, unlike the Spanish network (interinstitutional), there are two intra institutional networks: the British network and the Chinese network (Table 6). In 2009, the first British network was created in this field, with Love J. H. (Aston University) and Roper S. (University Warwick), still working (Figure 4(b)). The Asian network, with Guan J. C. and Yan Y., was created in 2014 (Figure 4(d)), both authors belonging to University Chinese Acad Sci (People's Republic of China).

On the contrary, the most productive American author, Lyles M. A. of Indiana University (Table 5), leads the most extensive international network with European links, along with Pedersen T. of the Centre of Strategic Management and Globalization (Denmark) and Volberda H. W. and van Wijk et al. (2008) of the Erasmus University (Netherlands) in 2008 (Figure 4(b)). In 2016, this network continues working and linked the American-Denmark-Dutch network to the Asian one (Table 6), by the common work of Lyles M. A. with Zhao X., belonging to China Europe Int Business Sch (People's Republic of China), with a Chinese intranational collaboration, Wu X. and Du J. of the Zhejiang University, Liu X. of Xiamen University, and Wang C. and Zhang G. of the Shandong University, and with a European collaboration, Vanhaverbeke W. of the Hasselt University (Belgium) and Duysters G. of the Tilburg University (Netherlands). The Canadian-Chinese (Table 6) network is made up of the Canadian scientists Clercq D. and Zhou L. of the Brock University in 2012 (Figure 4(c)), and then, in 2016, Wu A. Q. of Zhejiang University (Figure 3(d)) joined this Canadian network.

Table 7
Ten most productive institutions

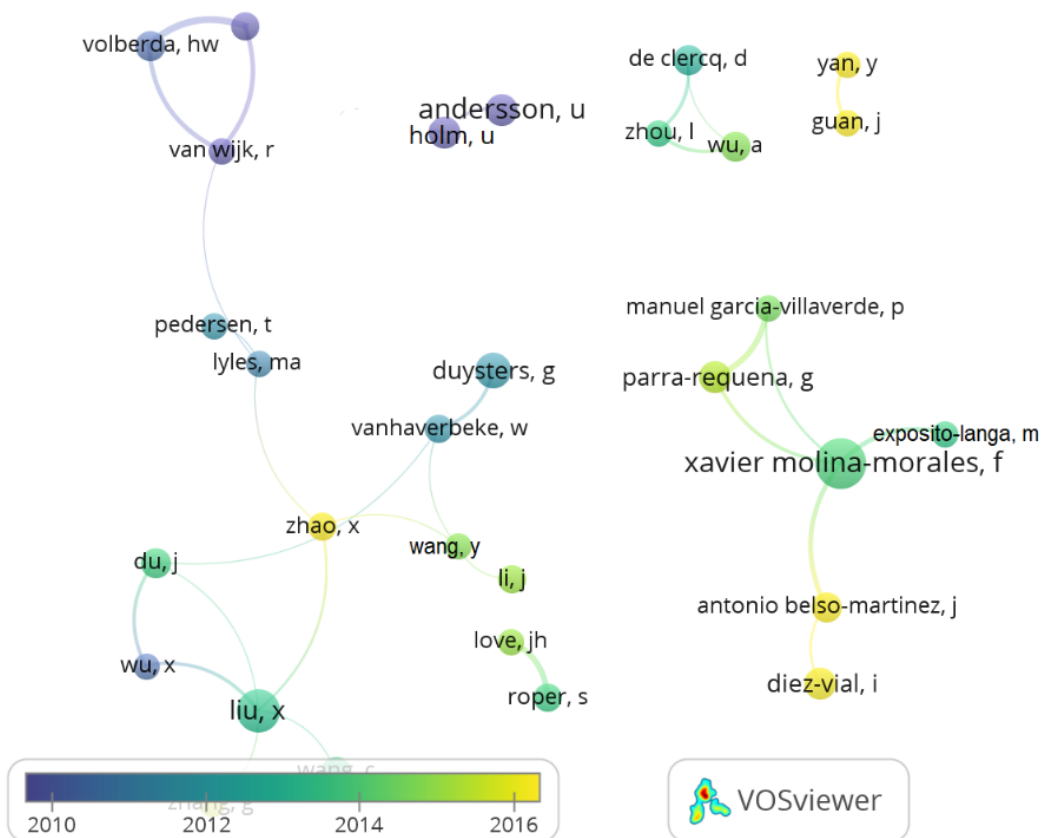
Rank	Institution	Country	A	C	C/A	1 st A	Last A	h index
1	University Castilla La Mancha	Spain	19	175	9.21	2010	2018	6
2	University Jaume I	Spain	17	437	25.71	2005	2018	9
3	Ctr Strateg Management & Globalizat	Denmark	17	702	41.29	2008	2017	11
4	Zhejiang University	People's Republic of China	16	202	12.63	2007	2018	7
5	University Granada	Spain	14	137	9.79	2008	2018	6
6	University Seville	Spain	14	424	30.29	2009	2018	10
7	Lappeenranta University Technol	Finland	12	318	26.50	2008	2013	6
8	Uppsala University	Sweden	11	839	76.27	2001	2018	6
9	University Utrecht	Netherlands	10	880	88.00	2009	2018	7
10	Erasmus University	Netherlands	10	621	62.10	2005	2017	6

Source: own elaboration with Web of Science and Scopus data (2018). A, total number of articles; C, number of citations for all articles; C/A, average citation per article; 1st A, year of the first published article; last A, year of the last published article.

To sum up, 3 collaborative networks worked until 2005 (G_1 3) in the field of interorganizational networks and the internationalization process. Thereafter, in 2008, the first

international network American-Denmark-Dutch (GJ₂ 2) was created becoming the first international network. The British network was born in 2009. In 2010, the Spanish network appeared, highlighting for being intrainstitutional and the most productive up until this time (GN₃ 2). Later, in 2012, the Canadian network emerged. In 2014, the Chinese group was born, and the Canadian and Spanish networks (GA₄ 2) were extended. Finally, 2014 highlights for the extension of the international network American- Denmark-Dutch-Chinese (GJ₄ 5) that continues being the unique international network. Finally, the Chinese scientists Zhao X., Yan Y. and Guan J., along with the Spanish scientists Belso-Martinez J. A. and Diez-Vial I. present the most recent scientific activity (Figure 5).

Figure 5



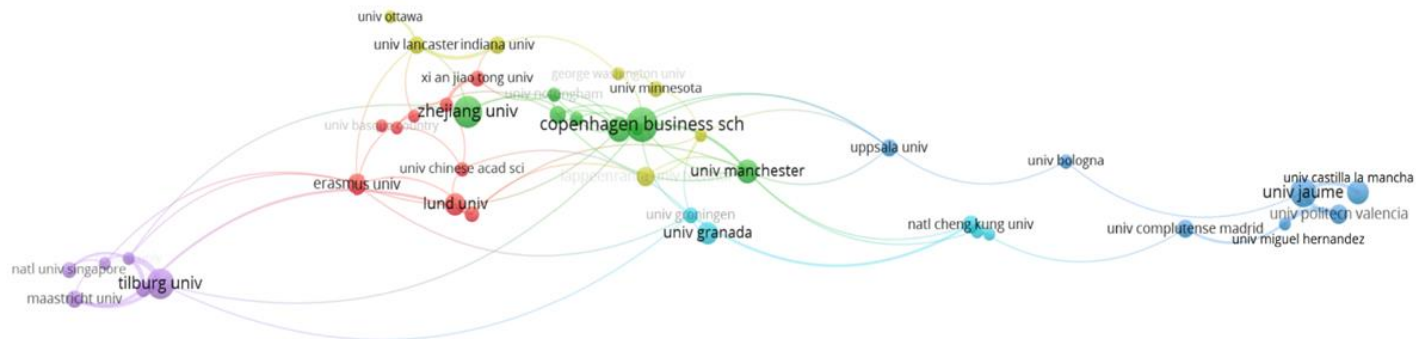
Within the 10 most productive institutions regarding publications about the reference topic (Table 7), nine of them are European and one is Asian. Though the number of articles published by each institution is relatively low (maximum 19, minimum 10, with an average of 14 articles per institution), the Spanish production stands out as it includes four institutions within the 10 main ones (Table 7), which in turn concentrates 40% (64 of 162) of the total of this country (Table 8). The same situation is presented with respect to the most productive authors (Table 5), three of them belonging to the first two most productive academic institutions and marking a significant presence from the moment that a growing interest began to be shown toward the topic under analysis (2010–2012), all of them being maintained active at the last record (2018).

Table 8
Top ten most productive countries

Rank	Country	A	<i>P</i> *	AP	<i>C</i>	<i>C/A</i>	1st A	Last A	<i>h</i> index
1	United States	228	327,096,265	0.70	4,672	20.49	1992	2018	66
2	United Kingdom	162	67,141,684	2.41	4,882	30.14	2001	2018	37
3	Spain	162	46,692,858	3.47	3,682	22.73	2001	2018	28
4	People's Republic of China	139	1,427,647,786	0.10	3,379	24.31	2006	2018	20
5	Germany	82	83,124,418	0.99	1,882	22.95	1999	2018	26
6	Netherlands	80	17,059,560	4.69	1,816	22.70	2000	2018	27
7	Italy	80	60,627,291	1.32	1,832	22.90	1995	2018	21
8	Taiwan	59	23,726,460	2.49	1,257	21.31	2001	2018	18
9	Canada	52	37,074,562	1.40	1,216	23.38	2003	2018	18
10	Australia	51	24,898,152	2.05	1,183	23.20	2007	2018	16

Source: own elaboration with Web of Science and Scopus data (2018). *United Nations Department of Economic and Social Affairs (2018) 1st July 2018. *A*, total number of articles; *P*, population (inhabitants); *AP*, number of articles per 1 million inhabitants; *C*, number of citations for all articles; *C/A*, average citation per article; 1st *A*, year of the first published article; last *A*, year of the last published article.

Figure 6



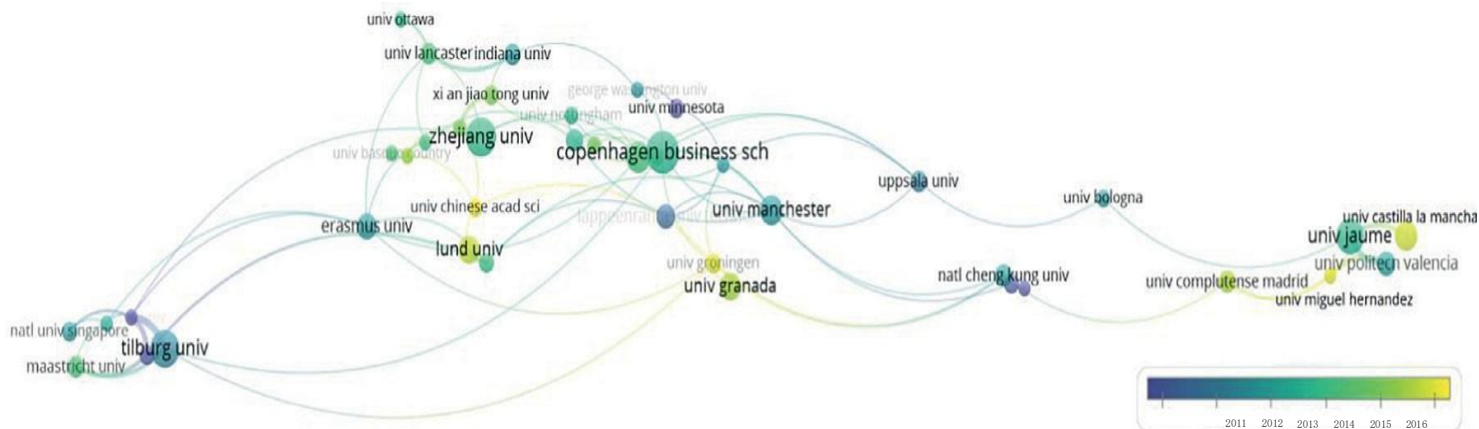
The institutional networks are based on networks formed among the scientists. The interinstitutional network formed at the international level, which studies the relation of ACAP with internationalization and network formation, presents six main clusters, taking into account 10 or more scientific works in common (Figure 6).

1. The blue cluster is the most productive inasmuch, as it includes five Spanish academic institutions. As can be seen from Table 7, they concentrate the most productive authors and it shows a relevant network between them. Surprisingly, other two Spanish universities, namely, Granada University and Seville University, are also productive regarding number of articles (Table 7), but there is a lack of linkage between them despite being geographically proximate.
2. The blue cluster, through the University Bologna and Uppsala University, is linked with the green cluster.
3. The green cluster is led by the Copenhagen Business School of the Centre of Strategic Management and Globalization of Denmark, the third research center of highest production at the global level (Table 3). This center is directly linked with British

universities (University Manchester, University Nottingham, and University Sheffield), the Dutch universities of the University Groningen (pale blue cluster) and the Tilburg University (violet cluster), and intercontinentally with the Asian university Zhejiang University, fourth at the global level for its productivity (Table 3). This Danish research center and the Chinese university are the most interrelated academic institutions at a global level.

4. The Zhejiang University is linked with the yellow cluster made up of a British university (University Lancaster), a Canadian university (University Ottawa), U.S. universities (University Indiana, University George Washington, and University Minnesota), and Finnish universities (Aalto University and Lappeenranta University Tech.).
5. Further-more, Zhejiang University works in collaboration with the red cluster, formed by other Asian institutions (Hong Kong University, University Chinese Acad Sci, and Xi An Jiao Ton University of the People's Republic of China) and European institutions (Erasmus University and Oxford University, among others).
6. Finally, Zhejiang University is interrelated with the violet cluster made up mainly of European universities, such as Hasselt University, Tilburg University, Maastricht University, and the Natl. University Singapore of south-east Asia. Lastly, the smallest cluster is formed of two European academic institutions, University Groningen and University Granada. Timewise, the institutions which present the most recent scientific activity (Figure 7) are University Chinese Acad Sci and University Groningen, and within the most productive cluster is the University Castilla La Mancha and the University Politech, Valencia.

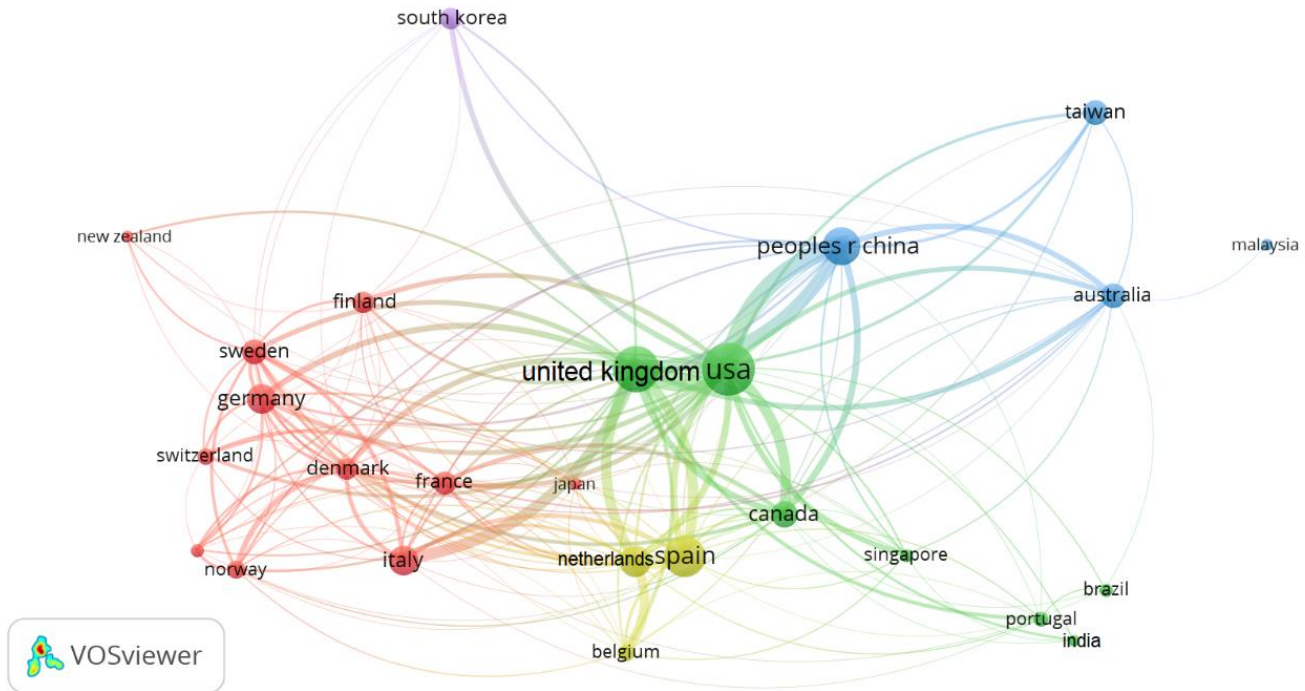
Figure 7



This behavior is reproduced in some way in the origin of the researchers and/or institutions involved (Table 5). Almost two-thirds of them (1,095 articles published by researchers and institutions of these countries out of a total of 1,711) have their origin in only 10 countries (Table 8). In addition, the five first countries of the ranking have been responsible for 45% of the total production (773 out of 1,711) and their composition within this universe of 5 is distributed among countries belonging to the European Union (53%), the United States (29%), and the People's Republic of China (18%), which are in turn the three main actors of the global economy and trade.

If we analyze the structure of the research at the country level, taking into account 15 or more works in common, five clusters are noted (Figure 8). Two of the most productive countries are intensely related in the green cluster, the United States and the United Kingdom, where the United States is directly related with Canada.

Figure 8



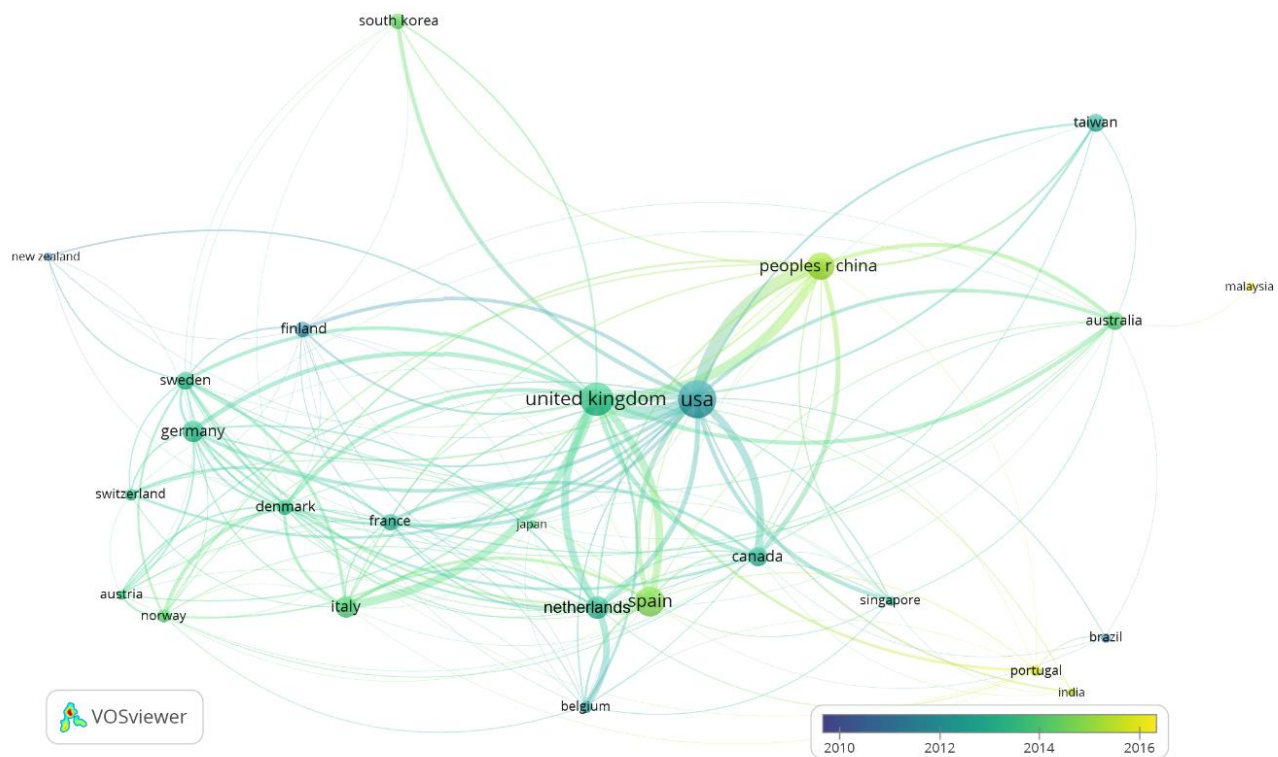
On the contrary, Spain and its intranational and interinstitutional network are located in the yellow cluster, along with Belgium and the Netherlands. The red cluster is the most numerous, made up mostly of European Union countries, such as Denmark, France, Finland, Germany, Sweden, and Italy. The blue cluster is formed by south-east Asian countries and is led by the People's Republic of China, which presents a direct and intense relation with the United States.

In the previous section about the analysis of the evolution of the volume of scientific production on the concept of ACAP linked with network formation and the process of firm internationalization, the article of Szulanski (1996) titled "Exploring internal stickiness: impediments to the transfer of best practice within the firm" mainly stood out. As well as being one of the first articles which specifically links ACAP with network formation, it was published in the Strategic Management Journal, which also figures in the top ten group of the most published

journals (Table 3). It is as well the most cited article since 1994, so it can be considered as an article which marks a trend in the topic analyzed (Table 4).

The countries which show scientific activity in the most recent network (Figure 9) are the People's Republic of China, Portugal, and India.

Figure 9



The article titled “Clusters and knowledge: local buzz, global pipelines and the process of knowledge creation” is the second most cited. It deals with the spatial clustering of economic activity and its relation to the spatiality of knowledge creation in interactive learning processes. It questions the view that tacit knowledge transfer is confined to local milieus, whereas codified Knowledge may roam the globe almost frictionlessly.

Their hypothesis therefore was that the more developed the pipelines between the cluster and distant sites of knowledge, the higher the quality (and value) of local buzz benefiting all firms in the local cluster. This is why a firm will learn more if its neighbouring firms in the cluster are globally well connected rather than being more inward-looking and insular in their orientation.

Finally, some policy implications, stemming from this argument, are identified, especially in the development of global pipelines, which requires institutional and infrastructure support. In the third most cited article, titled “Knowledge transfer in intraorganizational networks: effects of network position and absorptive capacity on business unit innovation and performance,” Tsai (2001) carried out an empirical analysis about 24 business units in a petrochemical company and 36 business units in a food-manufacturing company and concluded that organizational units can produce more innovations and enjoy better performance if they occupy central network positions that provide access to new knowledge developed by other units and depend on the units’ absorptive capacity or ability to successfully replicate new knowledge. In Reagans and McEvily’s (2003) article titled “Network structure and knowledge transfer: the effects of cohesion and range,” the research considered how different features of informal networks, such as network structure influences, affect knowledge transfer.

Their results indicated that both social cohesion and network range ease knowledge transfer, over and above the effect of the strength of the tie between two people. The last of the five most cited articles is the article of Yli-Renko et al. (2001), titled “Social capital, knowledge acquisition, and knowledge exploitation in young technology-based firms,” in which they examined the effects of social capital in key customer relationships on knowledge acquisition and knowledge exploitation.

They carried on an empirical study of 180 entrepreneurial high-technology ventures based in the United Kingdom. The most cited articles mentioned of this search are focused on the study of ACAP and different types of networks, but they do not deal with the link of ACAP with internationalization. Meyer-Krahmer and Reger's (1999) article, although it is the first one which relates ACAP with firm internationalization topics, is not the most cited paper. Lavie and Miller's (2008) article, titled "Alliance portfolio internationalization and firm performance," published in the journal *Organizational Science*, has 184 citations. This study introduced the notion of alliance portfolio internationalization, which refers to the degree of foreignness of partners in a firm's collection of immediate alliance relationships.

They test the framework using data on the alliance portfolios of U.S.-based software firms (1994–2001), and their results provide support for the sigmoid relationship as well as for our predictions that firms, which have gained experience with foreign partners and maintained wholly owned subsidiaries in their partners' countries of origin and can overcome some of the liabilities of alliance portfolio internationalization and better leverage its benefits.

2.3.2 Content analysis

The number of articles which have ACAP as a topic axis has grown notably since 2008 (Figure 2) and have conserved, over the 25 years of the period analyzed, a close relation with three key concepts: innovation, networks, and their performance or innovative result. Firstly, the close relationship of innovation concept with ACAP construct stands out (Tables 9 and 10 and Figure 10). This is highlighted even more if it is taken into account that the word "innovation" is not in the search formula. The second term emphasizes the topic of networks, a concept which, the same as innovation, is not a fashion in the scientific production as it remains invariably and significantly linked during all the periods.

On the contrary, the studies concerning the result (performance) of ACAP in relation with the innovative result and its greater competitiveness have appeared more intensely in the last 10 years and stand out even more so if they are added to those which specifically address the performance of SMEs (Figure 10, period 2014–2018).

Table 9
The most used keywords

Rank	Keywords	A	%	A	%	A	%
1	<i>Absorptive-capacity</i>	1604	30.99	195	19.92	1,409	29.71
2	Innovation	680	13.14	113	11.54	567	11.95
3	<i>Networks</i>	578	11.17	89	9.09	489	10.31
4	Performance	515	9.95	47	4.80	468	9.87
5	Firms	387	7.48	65	6.64	322	6.79
6	Research and development	342	6.61	28	2.86	314	6.62
7	Knowledge	338	6.53	54	5.52	284	5.99
8	Knowledge transfer	278	5.37	31	3.17	247	5.21
9	Competitive advantages	239	4.62	31	3.17	208	4.39
10	Perspectives	225	4.35	31	3.17	194	4.09
11	Strategic alliances	209	4.04	30	3.06	179	3.77
12	Capabilities	206	3.98	26	2.66	180	3.80
13	Management	188	3.63	18	1.84	170	3.58
14	Technology	186	3.59	30	3.06	156	3.29
15	Multinationals	184	3.55	21	2.15	163	3.44
16	Firm performance	172	3.32	8	0.82	164	3.46
17	Organization	164	3.17	40	4.09	124	2.61
18	Dynamic capability	158	3.05	12	1.23	146	3.08
19	Product development	153	2.96	17	1.74	136	2.87
20	Collaborations	142	2.74	23	2.35	119	2.51
31	<i>Internationalization</i>	91	1.76	10	1.02	81	1.71
	Total keywords	5176		979		4,743	

Source: own elaboration with Web of Science and Scopus data [bib73\(2018\)](#) processed with VOSviewer software.

Though numerous other links exist which relate ACAP with diverse and varied topics, it is also important to note that there is a greater relevance of the association of the topic with SMEs than with large firms, as well as the association with other firm dynamic capacities, in particular those linked to the management of knowledge. The previously revealed verification (the greater association of the ACAP construct with SMEs) is logical and reasonable given the possibilities of innovating SMEs being much more related with the possibility of accessing external knowledge than that of generating new knowledge. This is particularly due to the scarcity of resources available for this purpose, at least if we compare them with large firms.

In a similar vein to what was stated before, SMEs should find advantages in their internationalization process from ACAP and the innovations derived from it. However, evidence does not exist, at least until now, that the studies in this sense are relevant. On the contrary, Table 4 shows that “internationalization” only appears in the position 31 of the most used keywords, which confirms the scant relevance given to the topic in the articles analyzed.

Numerous works published in recent years, and which we have already provided an account of, show the positive influence of networks in the internationalization process of SMEs as do the previous experience, which they have had in external markets and the favorable environment to inter- nationalization in which they participate.

The temporal evolution was examined by considering the keywords timelines. The frequencies were normalized by the total number of keywords in each timeperiod. The resulting timelines are shown in Figure 10. The timelines of ACAP show an extraordinary growth, but its growth rate decreased in the last period (2014–2018). This type of visualization allows detecting keywords that can belong to different research fields. For example, the first sub period (1994–1998) shows that the keyword “firm” is the one that has increased. The keyword “performance” emerged in the second sub period (1999–2003) until the fourth sub- period. Thus, in the third sub period, the keyword “firmperformance” emerged and its use has increased until the last sub period.

As can be seen in the cluster analysis of Figure 11, eight heterogeneous keyword groups are shown in different colors. There are two clusters that stand out. First, the red node labelled “absorptive-capacity” is related to other nodes such as “dynamic capacity” y “knowledge acquisition,” which are related conceptually. Second, the green node labelled “innovation” is linked to “networks” keyword together with “collaboration,” “research and development,” and

“technology”. Finally, the word “internationalization” is related directly to the red cluster but in a peripheral place.

Figure 12 shows the keywords tendency. As can be seen, the current keywords most used appear in yellow, which share the core concept of innovation, such as open innovation, innovation performance, product innovation, innovation capability, and technological innovation. In a similar way, other trendy keywords are firm performance and collaborative networks.

As can be seen in Figure 12, the sustainability topic has gained relevance and interest. Attention is paid to sustainable development and sustainability oriented innovation (SOI). In such a vein, the sustainability concept, by sustainable development of Brundtland (1987) report, is highlighted in the context of SMEs, as a challenge to achieve competitive advantage by innovation. Moreover, Melane-Lavado and Alvarez-Herranz (2018) argue that the achievement of sustainability is mainly due to innovation and they presented a comparative study to try to shed light on the possible differences in the paths taken to obtain SOI by firms with and without Foreign Direct Investment, considering their different forms of knowledge management.

However, the evidence gathered in this bibliographic study shows that there still exists a practically unexplored field referring precisely to the relationships between networks and the internationalization of SMEs, and the positive moderator effect of ACAP in this process.

Keywords, such as innovation capability, and SMEs give an idea of the current trends and close relationship with networking, but much less significant with internationalization, and end up defining that opportunity of exploration.

Figure 10

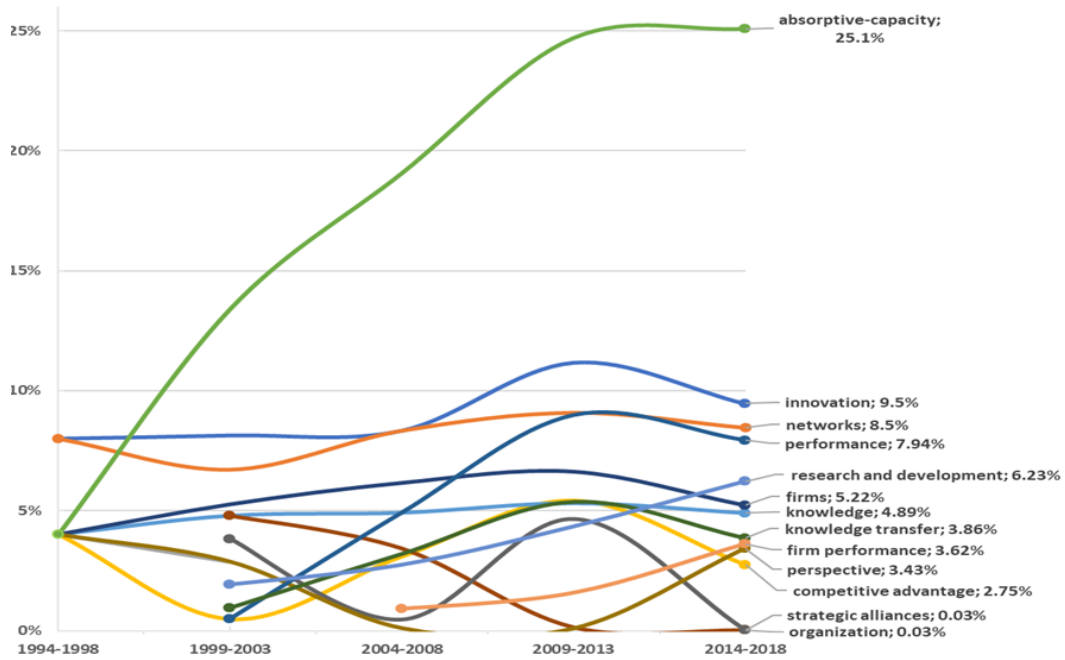


Figure 11

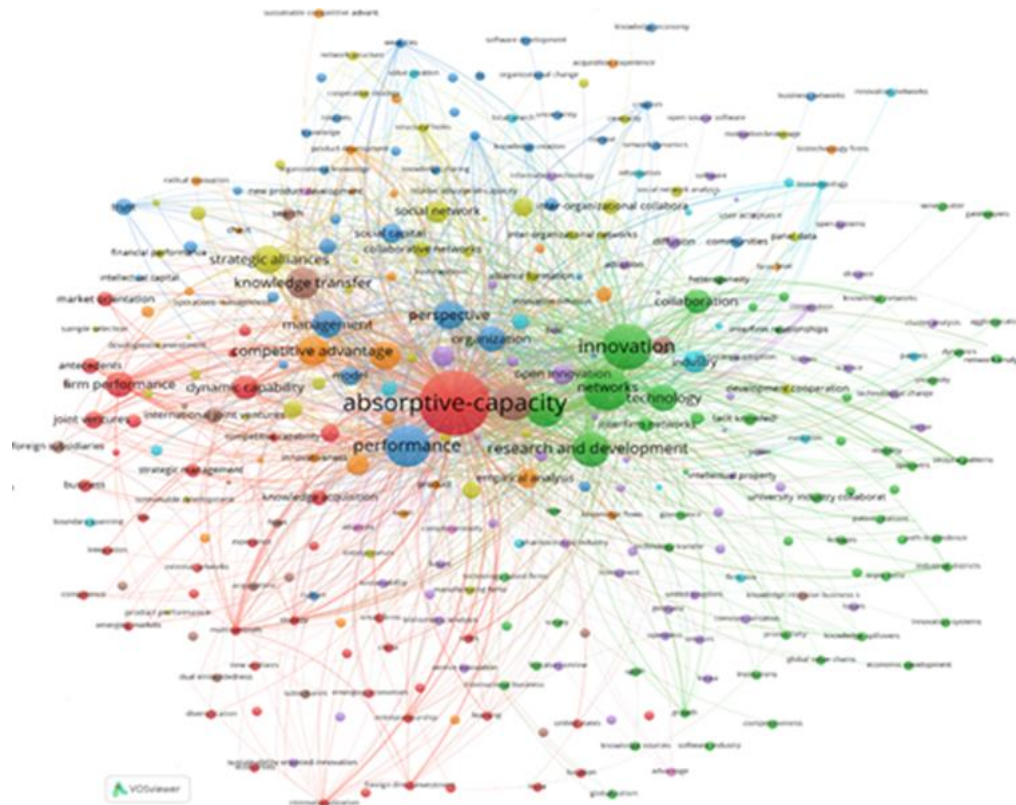
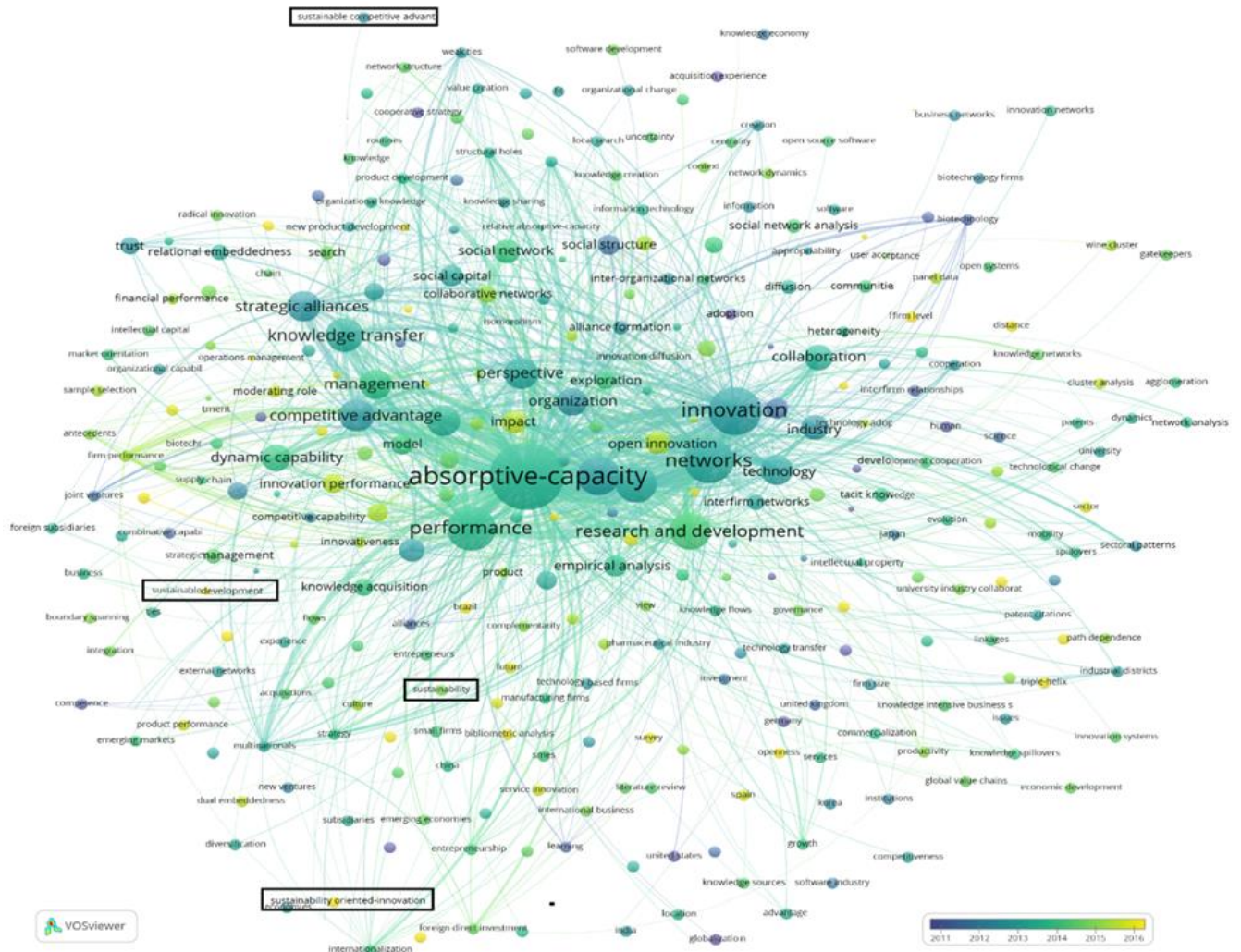


Figure 12



2.4 Conclusions

ACAP is a key factor in the greater competitiveness of firms, particularly of SMEs, as has been demonstrated in various studies referenced in this work as it enables innovating from the access to external knowledge. This greater competitiveness is indispensable when developing strategies of accessing international markets, and in this sense, interorganizational networks favor the process of internationalization, and ACAP acts as a factor which positively moderates this relation.

For this reason, the keywords “ACAP” and “Internationalization-Networking” were selected, meaning to understand how the study of these topics has been developed and how this study is currently and if there exists a gap which a research field can work on.

To that effect, it is verified that the scientific production reviewed in this study with the methodology described and which links the concepts of ACAP and internationalization-networking is found to be closely linked to their concepts of innovation and of performance. In the last five-year period, a growing trend has been perceived toward studies which include the topic of SMEs more intensely, but there is a still scant interest in internationalization. Hence, a field without enough exploration has emerged. As a consequence, scientific investigation of this may be used by researchers and entrepreneurs to improve their international competitiveness.

The evidence of the survey carried out shows only 5 networks or clusters of countries and institutions where these studies are relevant, and of them, only 2 have a purely international profile, the North American-European-Asian network and the Canadian-Chinese one. Among the local networks (Spanish, Chinese, and British), the Spanish network stands out for its production and for being the only one with an interinstitutional profile. The other 2 lack this, concentrating themselves mainly on their own study and research centers.

The keywords tendency analysis shows that the current keywords most used share the core concept of innovation, such as open innovation, innovation performance, product innovation, innovation capability, and technological innovation. In a similar way, other trendy keywords are firm performance and collaborative networks. Finally, the sustainability topic has gained relevance and interest. Moreover, attention is paid to sustainable development and sustainability oriented innovation (SOI).

Although bibliometrics offers valuable information to support research evaluation,

Waltman and Noyons hold the position that bibliometric data sources such as Web of Science and Scopus offer only a limited coverage of the scientific and scholarly literature. International journals are typically well covered, but the coverage of national journals, journals in social sciences and humanities, conference proceedings, and books is much more limited. Finally, there is a bias of databases in favor of the literature in English, using a certain set of keywords for the search. Another point to bear in mind about significant disciplinary differences is that different scientific fields have distinct publication, authorship, and citation practices.

Future research in the field of bibliometric studies could be the analysis of bibliometric indicators by 3D visualization.

Table 10
Evolution of the most used keywords

Rank	Keywords	1994-1998		Keywords	1999-2003		Keywords	2004-2008		Keywords	2009-2013		Keywords	2014-2018	
		A	%		A	%		A	%		A	%		A	%
1	Innovation	2	8.0	Absorptive-capacity	28	13.40	Absorptive-capacity	167	19.06	Absorptive-capacity	484	24.71	Absorptive-capacity	923	25.10
2	Networks	2	8.0	Innovation	17	8.13	Innovation	94	10.73	Innovation	219	11.18	Innovation	348	9.46
3	Adoption	1	4.0	Networks	14	6.70	Networks	73	8.33	Networks	178	9.09	Networks	311	8.46
4	Adaptation	1	4.0	Firms	11	5.26	Firms	54	6.16	Performance	176	8.98	Performance	292	7.94
5	Best practice transfer	1	4.0	Knowledge	10	4.78	Knowledge	43	4.91	Firms	130	6.64	Research and development	229	6.23
6	Capabilities	1	4.0	Organization	10	4.78	Performance	43	4.91	Competitive advantage	106	5.41	Firms	192	5.22
7	Competence	1	4.0	Strategic alliances	8	3.83	Organization	30	3.42	Knowledge transfer	105	5.36	Knowledge	180	4.89
8	Competitive advantage	1	4.0	Industry	7	3.35	Knowledge transfer	28	3.20	Knowledge	104	5.31	Knowledge transfer	142	3.86
9	Internal stickiness	1	4.0	Perspective	6	2.87	Competitive advantage	27	3.08	Strategic alliances	91	4.65	Firm performance	133	3.62
10	Knowledge			Capabilities	6	2.87	Technology	25	2.85	Research and development	85	4.34	Perspective	126	3.43
	Total keywords	25	48.0		209	55.98		879	66.76		1959	85.66		3678	78.19

Source: own elaboration with Web of Science and Scopus data bib73(2018) processed with VOSviewer software.

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CHAPTER 3

The positive moderating effect of absorptive capacity on R&D investment: the case of Argentina's ICT firms.

3.1 Introduction

The growth of the internationalization of SMEs has become a world tendency favored by the development of communications, information management and transport technologies (Navarrete-Hinojosa et al. 2016). For this reason, an increasing number of SMEs are entering world markets under different modalities (Lau and Lo 2015, Kotabe et al. 2014).

Internationalization demands that SMEs keep up with a high competitive level. For this reason, they are forced to put a lot of effort into R&D to have access to resources that are additional to the ones that they have, such as disruptive technologies, production forms, commercialization and/or distribution, qualified staff and, in general, any other resource that will allow them to beneficially use the external knowledge available (Chiva et al. 2014, Chetty and Stangl 2010, Porter 1998, Dunning 1998).

Management becomes a key factor to sustain an innovative process that will allow SMEs to be internationally competitive (Tsai 2014, Baum et al. 2000). In this sense, inter-organizational networks have a favorable impact in the innovative process, boosting their international performance according to the size and level of internationalization which they have (Ghodbane and Affes 2016, Guler and Nerkar 2012, Cavusgil and Knight 2009, Oviatt and McDougall 2005). On the other hand, there is empirical evidence concerning the positive influence of ACAP (Cohen and Levinthal 1990) on the innovative process (Kohlbacher et al. 2013) and its direct relation with the internal effort put into R&D (Ebers and Maurer 2014, Bertrand and Mol 2013). The influence of ACAP related to innovative results has been studied in regional systems (Navarrete-Hinojosa et al. 2016, Lau and Lo 2015) and its positive moderating effect has been proved. This paper explores the causal relations that the variables mentioned have had with the international performance of SMEs from the IT services business in Argentina. At the beginning of the 2000s they managed to introduce themselves into foreign markets motivated by the advantage of a

favorable exchange rate that boosted the objective quality of their assets and services. This advantage was sustained until 2007 when these enterprises could not keep their international competitiveness up to date (Barletta et al. 2013). Given the circumstances mentioned, it should be understood that there are causes that sustain the international competitiveness that could be related to ACAP.

Both the positive relation of the networks in the innovative process and the impact of ACAP as a moderating variable are justified in several papers. In Guler and Nerkar (2012), Chetty and Stangl (2010) and Oviatt and McDougall (2005) there is evidence of the impact of the networks and in Ghodbane and Affes (2016), Kotabe et al. (2014), Tsai (2014), Aljanabi et al. (2014) and Kohlbacher et al. (2013) of the positive moderating effect of ACAP. Nevertheless, no evidence exists of the causal relation between both variables in connection with the IT services SMEs with regard to their process of internationalization. The results obtained in this study show the favorable influence of the inter-organizational networks which are larger and have and have a higher level of internationalization on the innovative process of SMEs from the IT services business in Argentina and of the positive relation with ACAP as a moderator.

3.2 Literature review and research hypothesis

3.2.1 Investment in R&D and innovative result

Innovation is a multidimensional process that essentially implies novelty (Chetty and Stangl 2010) and was also defined at the OECD in (2005) as the “implementation of a new product or service or their significant improvement, a better or improved process or marketing method or a new organizational method in business practices”.

Innovations that involve a novelty (radical) and the ones that imply an improvement (incremental) are based on their own knowledge as well as other knowledge that is external to them and to the one that the company accesses and benefits from. Traditional theories on the influence of external knowledge in the innovative process of companies (Bell 1995, Knight and Cavusgil 1996) explain this by using the example of allowing companies to acquire additional resources and capacities that, when properly managed, translate into a growing participation of the innovative results in the total sales. This fact can be verified, especially, in those SMEs with less possibilities of access to strategic resources and, for this reason, it is in these companies where the external knowledge acquires a bigger influence in the innovative process (Achcaoucaou et al. 2014, Chetty and Stangl 2010, Johanson and Vahlne 2009, Oviatt and McDougall 2005).

One of the main objectives of the SMEs is, indeed, to manage the access to complimentary resources such as qualified staff, disruptive technologies, new production forms and any other that allows using beneficially the external knowledge available. (Chiva et al. 2014, Tsai 2014, Chetty and Stangl 2010, Baum et al. 2000, Porter 1998, Dunning 1998). The interest of the SMEs for seizing these external sources of knowledge through the interaction with the environment is reflected in the theory called closed innovation (Chesbrough et al. 2006, Chesbrough 2003). The theory presents the idea that, with the purpose of generating an additional value, companies can and must use either their own ideas or ideas from other companies that can be obtained through external channels (Necoechea-Mondragón et al. 2016, Hervas-Oliver et al. 2012, Murovec and Prodan 2009, Chesbrough 2004, Meeus et al. 2004, Nonaka and Takeuchi 1995).

Companies that have an open attitude toward innovation have a double benefit: the learning process itself and the possibility of obtaining more secure grounds of development of the

innovative process (Love et al. 2014). Benefits are enhanced if they adopt a proactive attitude and manage relations that can act as a complement to the benefits expected by the company.

3.2.2 Inter-organizational networks and innovative result

The access to knowledge from external sources is critical for the innovative process (Trantopoulos et al. 2017) and these external sources act as enablers of the learning processes implied in the development and support of such relations (Gibb et al. 2016). Luo and Bu (2017) state that those companies that conduct a “compositional” internationalization strategy by means of the development of collaborative networks and international partnerships obtain a better result.

The size and the level of internationalization of these networks are two factors of particular importance (Guler and Nerkar 2012, Cavusgil and Knight 2009, Zucchella and Scabini 2007, Oviatt and McDougall 2005, Zahra and George 2002, Coviello and Munro 1997, 1995). The intensity of the connection between the nodes of the network (Zahra and George 2002) is a determinant factor of the importance of the role which they have in the own innovative process (Coviello and Munro 1997, 1995). Usually networks are constructed from personal relations that are promoted with the aim of obtaining basic knowledge as well as resources that are not available for the company and which will allow maintaining a competitive advantage (Herstad et al. 2014, Bertrand and Mol 2013, Chetty and Stangl 2010, Johanson and Vahlne 2009, Kogut 2000, Birley 1985).

Chen and Wang (2008) point out that personal relations developed inside the company (internal networks) as well as the existing ones with other strategic partners (external networks) add value to the process. The internal networks allow the interchange and transfer of knowledge between the members of the company (Coleman 1988) whereas the external networks represent

the social capital that can be exploited by the company in its relationship with the other partners in the network (Gellynck et al. 2007, Burt 1992).

The size of the network allows establishing relations with different actors, improving and increasing the benefits derived from the network itself and enhancing the advantages of each bond (Feng-Jyh and Yi-Hsin 2015). Demirkan and Demirkan (2012) and Brink (2017) show that the intensity of connections as well as the heterogeneity of knowledge and experiences lead to innovation. The strength of a big size network is given by the innovative potential (Demirkan and Demirkan 2012, Guler and Nerkar 2012) where strong and weak networks are configured.

The positive impact of the connections of the international networks derives also in an easier and faster access to new knowledge (Zhou et al. 2007). Stoian et al. (2017) show networks help the process of accumulation of information concerning foreign markets, which is vital for international success. The own process of internationalization, understood as “an integrated group of strategic decisions and operations that allow the establishment of worldwide stable connections by means of a process (conscious and intentional) of growing international involvement of the company” (Welch and Luostarinen 1988), denotes the possibility of obtaining new ideas in different contexts than the original one.

Jones et al. (2011) and Rialp et al. (2012, 2002) contribute to this vision and explain how networks and social capital are positively influenced by the internationalization. In the same way, companies with founders or entrepreneurial teams with international experience improve the process of internationalization and seize more intensely the available resources (Oviatt and McDougall 2005, Shrader et al. 2000, Reuber and Fischer 1997).

3.2.3 ACAP as a moderator of the influence of the inter- networks in the innovative process.

The concept of ACAP introduced by Cohen and Levinthal (1990) has been verified, used and discussed by different authors through subsequent years (Lane et al. 2002, Zahra and George 2002, Lane and Lubatkin 1998) This concept exhibits a significant importance to analyze the business ability of seizing the external knowledge, combining it with its own domains and generating a dynamic learning and feedback that favor the innovative process and subsequently the maintenance of competitive advantages.

So, ACAP refers to the ability to recognize the value of the new knowledge that is external to the firm by assimilating it and applying it to business opportunities and has 3 basic dimensions: 1) the recognition of the value of the external knowledge, 2) its assimilation, and 3) its application and its transformation into business opportunities. A higher level of ACAP allows the company to be more proactive and innovative as it is prepared to detect and seize the opportunities presented in the environment.

Lane and Lubatkin (1998) moved further than the 3 basic dimensions of the original construct by adding the idea of the “relative absorptive capacity”. They define this concept within the framework of the relation between companies rather than the relation between companies and the market. They conclude that the ACAP of a “sender” company to a “receiver” one is based on the dimensions mentioned before but adjusted to the new context. That is to say, it is necessary to adjust: 1) to the new knowledge offered, 2) to the organizational structure, and, 3) to the dominant logic in such a way that it allows its utilization.

Zahra and George (2002) introduce a conceptual extension of the construct, according to which ACAP constitutes “a group of organizational routines and strategic processes by means of which companies acquire, assimilate, transform and exploit knowledge with the intention of

creating value". The construct becomes, then, characterized by 4 dimensions instead of the original three: 1) acquisition, 2) assimilation, 3) transformation, and 4) exploitation or use of the external knowledge. These 4 dimensions are, in turn, grouped into 2 components: 1) the potential absorptive capacity (acquisition and assimilation of knowledge coming from external sources), and 2) the realized absorptive capacity (transformation and exploitation of knowledge through business opportunities carried out by the company).

The intensity of ACAP measured with regard to the investment in R&D has been developed in Hervás-Oliver et al. (2012) and Cepeda-Carrión et al. (2012) link it to the organizational design. Roberts et al. (2012) relate it to systems of information management, Camisón and Forés (2011) to the capacities of internal creation of knowledge, Lev et al. (2009) to the influence of the environment, Todorova and Durisin (2007) to practices for social integration, Kostopoulos et al. (2011) to the level of externalities and Escribano et al. (2009) evaluate the participation in professional associations. Camisón and Forés (2014) gather precedents in the relation between R&D and ACAP setting the scene for future investigations, Tsai (2009) connects them to the studies on technological innovation and Guler and Nerkar (2012) collect data from the pharmaceutical industry.

The aforementioned contributions facilitate the perception of ACAP as the ability of a company determined by two types of factors: 1) the ones managed by the company itself and 2) those that are external to the company and are the result of the interaction with other companies. We can conclude then, that the expenses in R&D and the international experience of the company in building the networks are key factors in the process. The investment in R&D aligns the whole organization in the innovative effort as it improves the abilities of its own participants by creating better potential conditions for the future, as described in Lane and Lubatkin (1998) and in Yipeng

(2017).

The importance of human capital in the construction of ACAP is also described in Cerrato and Piva (2012) who recognize, through empirical results that the level of such capital and the presence of foreign investments in SMEs influence positively their innovative result and internationalization. In the same way, Yao and Chang (2017) show in their study how individual characteristics contribute to the development of ACAP, Onkelink et al. (2017) account for the need for companies that search for a quick internationalization to have a high level of qualified staff to increase their general productivity and innovative aptitude.

The experience that the company could have developed through their activities in foreign markets with suppliers, clients, competitors or any other agent favors their own ACAP (Gibb et al. 2016, Dermikan and Dermikan 2012, Oviatt and McDougall 2005, Coviello and Munro 1995). A key indicator that shows the international aptitude of the company is the participation of exports in the total sales. Their importance shows how, as time passes by, the experience gathered in such markets provides a feedback in the process of building opportunities in foreign markets (Souchon and Diamantopoulos 1996). Additionally, Cortez-Verdu and Reinert (2015) point out that regular exporters keep more inter-organizational relations than occasional exporters and that they implicitly strengthen the innovative process.

Firms with little experience in foreign markets, due to low levels of exports, for example, generally pay less attention to the new information about foreign clients and other agents in the destination countries, even though this is something of significant importance (Bertrand and Mol 2013).

It could be stated that the articulation of these 4 abilities mentioned by Zahra and George (2002) (acquisition, assimilation, transformation and exploitation) conforms a dimension of

ACAP to develop innovations and that the participation of the company in bigger and internationalized inter-organizational networks is a factor that favors the access to a new and enhanced knowledge of their innovative process, which will be moderated precisely by the ACAP that it will be able to develop.

3.2.4 ACAP as a moderating variable

ACAP is used in different research papers about business management as an independent variable (68% according to the review from Jiménez et al. 2012) or dependent variable (24%) and to a lesser extent, as a moderating (5%) or control variable (3%) Most investigations are focused on the manufacturing business (Jiménez et al. 2012) and only 10% on companies from the service sector with an emphasis on those related to IT (55%).

When the ACAP is used as a moderating variable, the dependent variable tends to be the innovative result of the company such as presented by Murovec and Prodan (2009), Zahra and Hayton (2008) and Lane et al. (2002). The contributions where the ACAP is used as a moderating variable is verified in Kohlbacher et al. (2013), who explore the impact of ACAP on the innovation in a business cluster in Central Europe and Aljanabi et al. (2014) relate the organizational factors of support to a group of IT companies from Kurdistan with technological innovation. Tsai (2014) proves the moderating influence of the ACAP in the international expansion of companies from emerging economies in his study of 200 Taiwanese companies and Kotabe et al. (2014) in an examination conducted on 108 senior executives in China. In Guimaraes et al. (2016) the results indicate that the ACAP has a magnifying effect on the success factors of the innovative process.

Since the appearance of the ACAP construct it has been considered as an independent, dependent, and moderating or control variable in studies related to R&D results (Jiménez et al. 2012). Even though investigations that use other measures such as the effort of the company

to improve their learning process (Kim 1998), the experience companies accumulated in the potential or effectively realized ACAP (Jansen et al. 2005) or the networks with clients that the companies exhibit have been developed (Eriksson and Chetty 2003), the component of R&D prevails, however, as the measure mostly used in the different known investigations. This dominance is justified, for example, when the effort in R&D has a ratio that is higher than 60% of the use (in a direct way or combined with other components), as is shown in the 312 specific investigations carried out by Jiménez et al. (2012).

Kohlbacher et al. (2013) show empirical evidence of the impact of ACAP on the innovative process and they link it to the level of dynamism and competitiveness of the cluster with which the ACAP is related. Likewise, Bertrand and Mol (2013) point out that ACAP, favored by the internal effort put into R&D, generates bigger connections with foreign suppliers, conducting this way to positive results with regard to product innovation. Ebers and Maurer (2014) support the validity of the hypothesis on the 2 components of ACAP quoted by Zahra and George (2002), that is to say, the potential and the realized CA, and they also provide the evidence that each of them affect the results of the process in a different way.

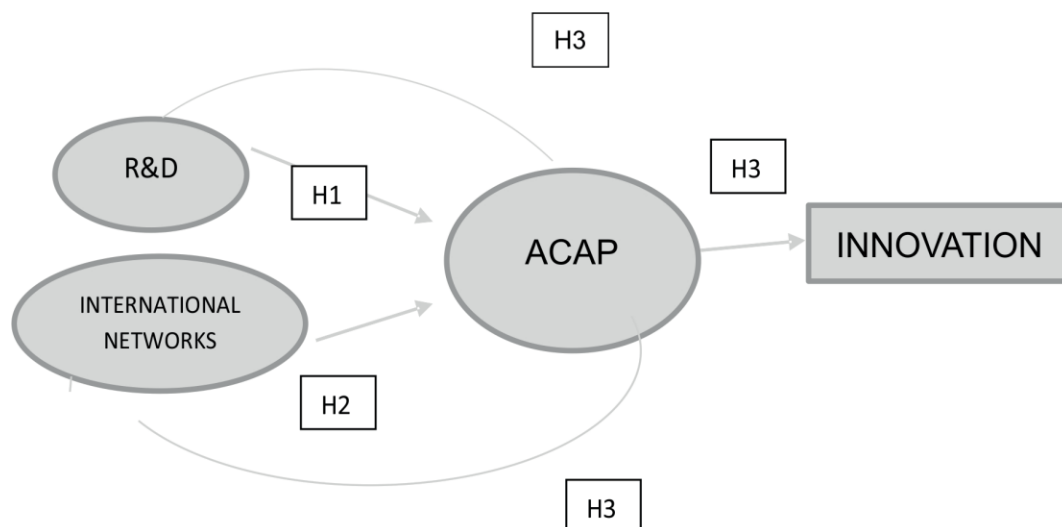
Lau and Lo (2015) have investigated the regional systems of innovation and the ACAP related to the innovative results. They explore the relations of the 4 dimensions of ACAP suggested by Zahra and George (2002) with the sources of information of the regional initiatives for innovation, the intensive services of business knowledge and the sources of information derived from the value chain, reaching the conclusion that they help to get a better performance of innovation. It could be said that one adequate measure, accepted and verified by empirical studies on ACAP, is comprised of the efforts and resources affected to R&D and to the level of internationalization of the company.

Considering the consequences of the described variables in the innovative process, the following hypotheses are being formulated (see Figure 1): *H1: There is a positive relation between the effort the company puts into innovation and its innovative result. H2: There is a positive relation between the size and the level of internationalization of the inter-organizational networks in which the company participates and its innovative result. H3: The absorptive capacity of knowledge of the company moderates the existing relation between the inter-organizational network of the company and its innovative result.*

The graph shows that both investment in R&D and International Networks are causes of an improvement in competitiveness (expressed in Innovations). However, the impact of these variables is moderated by the ACAP.

3.3 Methods

This investigation relies on a quantitative study conducted on IT services firms from Argentina based on a fieldwork whose aim was to gather information to this business activity (study conducted by researchers from the National University of General Sarmiento, Buenos Aires, Argentina, in 2011 and the use of their data was authorized by their main researcher, María



Florencia Barletta). The tool used was a structured questionnaire supported by the dynamics of a personal interview.

Data collection that was further processed with the help of statistics software accumulated a total of 944 variables (software used was IBM SPSS Statistics 23.0). For the analysis of correlation we have applied Pearson's Correlation Coefficient. Causal relations were established in the design of the questionnaire and the variables within the theoretical level. Afterwards, we proceeded to conduct an estimation by means of an analysis of multiple linear regression.

3.3.1 Definition of variables

The dependent variable is the *result of the innovative process* measured by the percentage share of the products or services with radical or increased innovations in the total sales of the period considering the 3 previous periods, which is in line with what Cassol et al. (2016), Kampik and Dachs (2011), Tsai (2009) and particularly Boschma and Weterings (2005) proposed, by analyzing 265 Dutch IT Services companies. Others like Ahuja and Katila (2001) and Hagedoorn and Cloudt (2003) define it starting from the number of patents obtained by the company within a certain period of time.

The independent variables adopted for this inquiry are: 1) the *innovative effort*, considered starting from the internal expenses in R&D related to the sales of similar period, and 2) the *connection to international networks* in which the company participates.

The study of the performance or *innovative effort* that starts from the expenses SMEs of IT services business devote to R&D is brought up by Romijn and Albaladejo (2002), who analyze the formal and informal technological efforts in R&D. Boschma and Weterings (2005) consider the innovative productivity defined as the quotient between the sales of new products developed by the company and the efforts in R&D as a dependent variable. Also, Sharma et al.

(2016) contribute with evidence on the relation between expenses in R&D and the innovative result.

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3.3.2 Moderating variable

The use of ACAP as a moderating variable in empirical investigations where the dependent variable is the innovative result of the company can be verified in Kohlbacher et al. (2013), Murovec and Prodan (2009) and Lane et al. (2002) and more recently in Aljanabi et al. (2014), Tsai (2014),

Kotabe et al. (2014), Leal-Rodríguez et al. (2014), Lau and Lo (2015), Ferreras-Méndez et al. (2015, 2016), Llopis and Foss (2016) and Guimaraes et al. (2016).

In this study, the ACAP was estimated starting from: 1) the qualifications of the human resources, and 2) the international profile of the business management.

The first indicator describes the level of *qualification of the personnel* in the company, considering for this purpose the number of employees with complete university or superior education (Romijn and Albaladejo 2002, Barletta et al. 2013), including graduates and post graduates. This indicator is on the same level as the proposal exposed in Jacobsson et al. (1996), Alegre and Pasamar (2018) and particularly Onkelink et al. (2017) who support that a strategy for fast internationalization needs staff with high degrees of training to be able to increase the general productivity (Yao and Chang 2017 and Necochea-Mondragón et al. 2016).

The second indicator considers the level of the *international management* derived from the participation of international capital or directors in the management and the increasing involvement with international networks. The first case considers whether in recent periods (within the 3 previous years) the firm has kept close relations with an international business group and in the second case the flow of international commerce within similar periods and measured through exports are taken into account.

Raff and Wagner (2014) have proved that firms in hands of foreign owners export more products and to a larger number of countries. More recently, Odlin and Benson-Rea (2017) supported this argument showing that the group management of business relations with foreign clients allows SMEs to avoid the direct competition with big companies and to keep other competitors out of their position within the network. Bertrand and Mol (2013), Tsai (2009) and Eriksson and Chetty (2003) relate the export performance with the formal and informal

connections the company has with clients, suppliers, competitors and/or science and technology institutions from other countries. Cortez-Verdu and Reinert (2015) claim that regular exporters keep a chain value with suppliers and clients that motivates them to become more active in international markets.

The *connection with international networks* related to the results of the innovation is described in Garriga et al. (2013) and Patel and Chrisman (2014) who provide empirical evidence about this. They also prove that the characteristics of the networks sometimes contribute to improving the innovative process as a whole. The evidence of the positive influence of the international networks in the innovative result can be also found in Chetty and Stangl (2010), Oviatt and McDougall (2005) and in Coviello and Munro (1995, 1997), among others.

3.3.3 Data analysis

The study gathered information from 189 firms working in the IT services business out of 250 selected from a total of 1800 surveyed in Argentina through Business Associations (Barletta et al. 2013) and governmental offices. The companies are distributed according to the geographic diversity of the activity in the country where they are located (Hitt et al. 1997).

The indicators of major relevance obtained were the results of the innovative process (innovations in the total of sales), the innovative effort (investment in R&D) and the connection with international networks (quantity of ties that the company keeps). The pertinent indicators to evaluate the ACAP were the qualification of the human resources (expressed in the participation of staff with university level) and the international management derived (participation of capitals or international managers on the one hand and exports as the representation of the continuous connection to foreign networks, on the other).

The hypotheses were verified using the multiple hierarchy moderating linear regression technique. The correlation of the independent variables was proved through both bivariate correlation and the method of inflation factor of the variance to check that the resulting estimators of such a regression would not be affected by the presence of multicollinearity problems.

3.4 Empirical results and discussions

The descriptive variables considered in the present study are shown in Table 11:

Table 11
Variables involved according to the N filtered

Variables	H	N	Mean	S.d.
Result of the innovative process	Participation of innovation in sales	19	2.334.919,15	5.079.338,61
			288.652,01	1.282.020,07
Innovative effort	Investment in R&D	18		
		9	0.86	1.343
Connections with international networks	Number of networks the company belongs to	18		
		9	24.58	66.16
Fi			57.88	139.48
ACAP: Qualifications in HR (Total number of employees).	Employees with university level	18		
		4		
		18	7.02	23.77
		7		
			2.033.612,51	14.831.868,98

International management:		
managers	a) Foreign capital or managers	18
	b) Exports	8
		18
		9

Source: own elaboration.

The first empirical verification evaluated the impact of the *innovative effect* over the *result of the innovative process (InnPrR)* (Tables 12 and 13) and subsequently the impact that assumes the connections with international networks (*CNe*) (Tables 14 and 15). Tables 12 and III show a high correlation, meaning that the (InnPrR) are explained largely (76.5%) by the Innovator Effort (InnEf) carried out by the company through the investment in R&D.

Table 12

Correlation: Innovative effort and result of the innovative process

Correlation Innovative Effort - Result of the Innovative Effort		Participation of Innovations in total sales	Investment in Research and Development (R&D)
Innovative Result	Pearson's Correlation	1	0.765
	N	189	189

Source: own elaboration.

Table 13

Lineal regression between innovative effort and result of the innovative process

Model	R	R-Squared	Corrected R-Squared	Common estimation mistakes
1	0.765	0.586	0.574	1.00775

Source: own elaboration.

Tables 12 and 13 express a low correlation between the number of international networks to which the company belongs to (Ne) and the InnPrR and they practically do not have any incidence in their results (a little more than 2%).

Table 14
Correlation: connection with international network and result of innovative process.

Connection with International Network - Result of the Innovative Process		Participation of Innovations in total sales	Number of International Networks the company belongs to
Innovative Result	Pearson's Correlation	1	0.234
	N	189	189

Source: own elaboration

Table 15
Lineal regression between innovative effort and result of the innovative process

Model	R	R-Squared	Corrected R-Squared	Common estimation mistake
1	0.234	0.055	0.05	4.950.892,76

Source: own elaboration

Table 16
Collibearity – tolerances

	Connection with International Networks	Participation of Innovation in Sales	Number of Employees with University Level	Total Exports	Participation of International Capitals or Managers
Result of the innovative process	0.826	0.412	0.628	0.854	0.826

Source: own elaboration

Even though there are correlated differences of each of the variables, both have a positive impact on the *InnPrR*. The analysis of how they are influenced by the ACAP should follow. With that purpose, and before establishing the estimation using the model of *Multiple Linear Regression*, the level of associativity between the *InnPrR* and the different control variables was

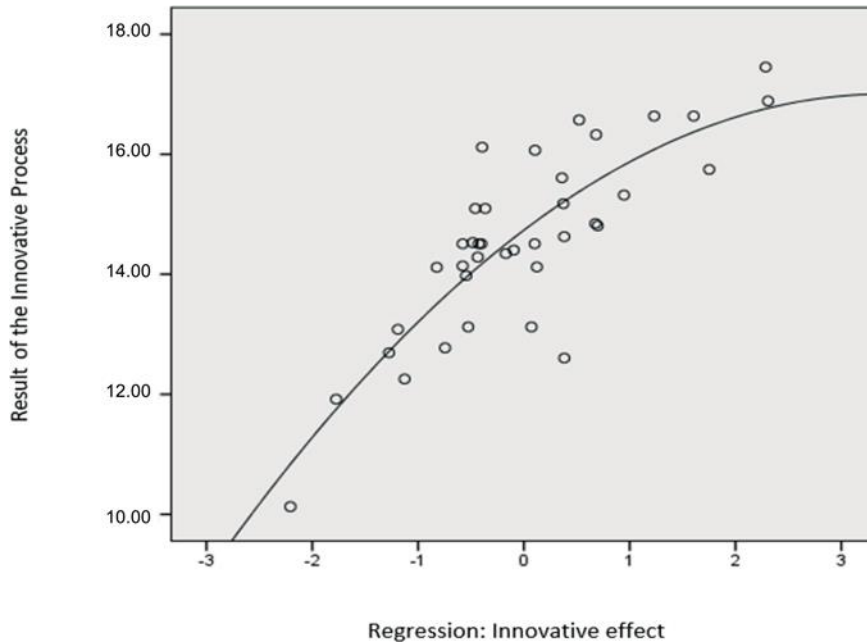
analyzed in search of possible problems of collinearity. To that effect, it was verified that there are no significant relations between the indicators that can cause such problems (see Table 17 and Figure 13).

Table 17
 Linear regression between innovative effort plus moderator variables and result of the innovative process.

Model	R	R-Squared	Corected R-Squared	Common estimation mistakes
1	0.815	0.665	0.624	0.94714

Source: own elaboration

Figure 13



As there are no signs of collinearity problems and once the significant correlation of the *InnEf* has been verified, the multiple linear regression, starting from a prediction of 22.6% (Table 13) between the independent (*InnEf*) and dependent (*InnPrR*), show the following results at the moment of considering the moderating variables (see Table 17 and Figure 2):

- Qualification of personnel in Human Resources: 79.9%
- International Management - International Capitals or Managers: 77.2%
- International Management - Exports: 80.7%
- The inclusion of the three variables delivers an estimation of: 82.5%

This way a very strong and significant correlation is proved between all the variables, including the moderating ones, each of these latter improves the prediction. The best result is observed when they act simultaneously (81.5%). This way, the *InnEf* is favored by the absorptive capacities of the companies that are measured through the aforementioned indicators. On the other side, the multiple linear regression that starts from a prediction of the 2.12% between the independent variable *Connection to international networks*, and the dependent one, the *InnPrR*, shows these other indicators:

- Qualification of personnel in Human Resources: 57.7%
- International Management – International Capitals or Managers: 21.7%
- International Management - Exports: 42.5%
- The inclusion of the three variables delivers an estimation of: 58.7%

3.5 Conclusions

This work contributes to the research carried out in regional systems of innovation and to the influence of ACAP with regard to innovative results. The results obtained have implications for all SMEs working in the IT business and also in the process of design of policies that support the development of their competitiveness. It as well enables checking importance to favor ACAP through qualified human resources, international management promoted by foreign capitals or managers and a continuous current of commercial relations with foreign agents through exports, which also grants value to the internal knowledge available.

Evidence to be pointed out is the intensification which ACAP acquires when the different

variables used to estimate it act together, showing that there is a positive relation between them that confirms the existence of different dimensions which are implicit in the very concept of ACAP. The results of the empirical models verify the main hypothesis, that is to say, how ACAP positively moderates the company's innovative effort, as well as the connections created by its participation in the international networks, even when this last variable does not have a high correlation in the kind of companies studied. For this reason, a need to go deeper into the verification arises. This would be done through investigating the size and the intensity of the connections with the nodes that shape the international networks (Oviatt and McDougall 2005, Demirkan and Demirkan 2012). Recent improvements (Navarrete-Hinojosa 2016, Lau and Lo 2015) suggest the significant role which what Oviatt and McDougall (2005) call "brokers" or "intermediaries" play in promoting the access to networks. To that effect, the role of the public agencies and universities in the construction of the inter-organizational networks opens the need to explore those roles in detail.

Similar to the "brokers", the role of the "gatekeepers" (Cohen and Levinthal 1990) should be also investigated in the detection of external knowledge that is useful for the SMEs of this area of expertise and which favors their ACAP. The relevance of the qualified human resources or those that have more or less intense and continuous connections with foreign markets in the construction of networks is clear, but there is new evidence related to the mechanism with which IT services SMEs (Barletta et al. 2013) can increase and improve the spreading of the external knowledge to which they have access.

In the end, and similar to what has been pointed out by Gallouj and Savona (2009), the analysis of the results presented makes it necessary to consider the specifications of the sector and the territory (country) where the companies are located so that relevant limitations can be

taken into account and new doors can be opened to new questions and future lines of research, allowing questions to be formulate about the reciprocal analysis between the moderating effect of ACAP and the innovative process (Aljanabi et al. 2014), and the dynamics of the introduction of new members or changes in the relations that characterize the networks in which they participate (Huggins and Johnston 2010).

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CHAPTER 4

Innovation and inter-organizational networks.

Start-up case study -

4.1 Introduction

SMEs often have a big participation in the productive structure of the different national systems, reaching participation of up to 90% of the enterprises, over 60% employment and between 50% and 60% GDP in European Union countries (Manera and Smigielska, 2020). Said signification becomes clear not only in developed countries but in others with a lesser degree of development, like Latin America's case, where enterprises with a technological foundation are gradually gaining more space (Arechavala Vargas, *et al.* 2015).

Said importance it is not replicated in a similar manner when the participation of SMEs in the international commerce because its own characteristics are limited to the accessibility and permanence changes in markets other than locals, because these do not have enough resources available. However, it has been observed in the last few years an increase in the participation, mainly due to the fact that an ever growing number of SMEs is entering into the global markets by exporting goods or as a participant in collaboration agreements (Lau and Lo, 2015; Kotabe *et al.*, 2014).

SMEs base their chance of accessing international markets in the results of their own innovative efforts, which are what equip them with the required competitiveness. In that sense, the investment in research and development fuels the growth of the innovations in the SMEs, like their insertion in inter organizational networks (Agramunt and Berbel Pineda, 2018; Ghodbane and Affes, 2016; Guler and Nerkar, 2012; Oviatt and McDougall, 2005).

Evidence of the positive influence of the knowledge absorptive capacity (ACAP) also exists, according to Cohen and Levinthal (1990), about the innovative process (Kohlbacher *et al.*, 2013), and their direct relationship to the internal effort in research and development (Bertrand and Mol, 2013; Ebers and Maurer, 2014). This influence of the ACAP has been studied in regional

systems in relation to the results of the innovation (Agramunt and Berbel Pineda, 2018; Navarrete-Hinojosa *et al*, 2016; Lau and Lo, 2015), proving its positive moderating effect.

With foundation in what was previously established, this work has the goal of researching about the innovative result reached, taking advantage of the inter organizational networks and the ACAP in the industry of Argentinian software development. The methodology used is case study. The study focuses in two different stages of the activities of a software development start-up enterprise. This enterprise started its activities in the year 2009, in accordance with the emergence of the computing cluster in Argentina.

The upcoming headings will deal with, first and foremost, a theoretical framework about the background of the investigation, development and innovation in the computing SMEs as a moderating factor of the innovative process, particularly in the internationalization process of said enterprises. Following that, the study proceeds with the fieldwork, through the presentation of the methodology and analyses of the obtained results in the analyzed enterprise. To close, the conclusions are presented, adding the final contributions and the limitations of the study.

4.2 Theoretical framework

4.2.1 *R+D + Innovation and inter organizational networks*

SMEs need to focus in innovation as a key factor in order to be competitive, and the pressure to achieve this grows as globalization does, while the life span of products becomes shorter, the change in technological dynamics is ever-greater, and the permanent mutation of the needs of the consumers.

Innovations are based in knowledge that is owned, managed and developed by the enterprise with its own resources or external knowledge with free access that the enterprise can approach. The limitations to finance research and development (R+D) processes that favor

innovation of one's own determine that the SMEs try to manage in the best way possible a group of complimentary resources, among them and particularly available external knowledge. They try that said knowledge flows towards the inside of the SME, in order to be appropriated and to finally be used in the creation of new products, services or processes (Necoechea *et al*, 2016; Chiva *et al*, 2014; Hervas *et al*, 2012; Murovec and Prodan, 2009).

To that end, SMEs promote, form and manage qualified human resources, while trying to take advantage of open source technologies, while interacting and bonding with vendors and competitors, they travel in order to understand ways of production and consumption in different markets, they link with public entities and universities which conditions and demands are attuned to the possibilities of the SME. In general, they try different ways to reach new ways to produce, commercialize and distribute that will allow them to use the available external knowledge (Chiva *et al*, 2014; Achcaoucaou *et al*, 2014; Tsai, 2014; Chetty and Stangl, 2010; Baum *et al*, 2000).

In this scenario, it is fruitful for the SMEs to participate in inter organizational networks, particularly international ones, because this allows them to access external markets under better conditions, and to take advantage of the opportunities these can provide (Trantopoulos *et al*, 2017; Gibb *et al*, 2016).

Networks favor the accumulation of information and knowledge, with is key if markets want to reach international success. At the same time, a reciprocal relationship is created between innovation, networks and internationalization potential, because the international experience acts as an enhancing factor of the innovative process (Stoian *et al*, 2017; Luo and Bu, 2017; Chetty and Stangl, 2010).

The enterprises that have an open attitude towards innovation and, in turn, participate in networks, are benefitted from the learning process and the ability of obtaining resources to the

development of the innovative process (Love *et al*, 2014). Generally speaking, this relationship is enhanced when the founders and/or the entrepreneurs with experience in the international market are more committed to the networks and take more advantage of them (Oviatt and McDougall, 2005; Shrader *et al*, 2000).

4.2.2 Knowledge absorptive capacity

Knowledge absorptive capacity is a concept introduced by Cohen and Levinthal (1990) and refers to the ability an enterprise has to value, assimilate and apply knowledge from external sources to the organization with the goal of generating income opportunities. Hence, the ACAP constitutes an important factor in the effort that SMEs do around R+D, and the one that make them actively participate in networks, because this is how competitiveness is improved.

A greater level of ACAP allows the SME to be more proactive and innovative because it equips it to detect and research any opportunity that the environment may present, since it is limited to the internal research and development process of new products, technologies and/or services. In this sense, ACAP turns into a key factor of a SME trying to reach internationalization.

ACAP is often used as an independent or dependent variable in different investigations linked to the international management of SMEs (Jiménez *et al*, 2012) but, to a lesser extent, like a moderating or control variable. When ACAP is used as a moderating variable, the dependent variable is often innovative result, while evidence indicate that ACAP has a positive effect in the success factors of the innovative process (Guimaraes *et al*, 2016; Murovec and Prodan, 2009; Zahra y Hayton, 2008), particularly over the internationalization process of this kind of enterprise.

Lau and Lo (2015), Eber and Maurer (2014), and Kohlbacher *et al's* (2013) contributions prove that the ACAP acts in a positive way over the internal effort in R+D, and the stronger link

with vendors, competitors, and general economic or foreign political agents result in better product innovation results.

Based in these theoretical fundamentals, a study was developed around the ITC sector in Argentina that can be found in Agramunt and Berbel Pineda (2018). The purpose was to evaluate the relationship between the innovation effort of the enterprise (R+D) and the internationalization level of the networks where this SME participated, with its innovative result and how the ACAP moderated said relationship.

To that end, information from a primary source was used through a structured questionnaire to which a personal interview dynamic was applied. 184 polls were made to enterprises, out of a total of 250 selected and 1800 found in Argentina through corporate chambers and government offices. To narrow the selection, a series of preliminary investigations were conducted by the responsible team, focusing in competences, innovative dynamics, performance, and links to several productive areas.

In order to analyze the *results of the innovative process*, the participation of the innovation over the sales total was used; the *innovative effort* was measure through the investment in R+D; the *link with international networks* was quantified through the amount of nodes or links, and in order to evaluate the ACAP: 1) *qualification of the human resources* in the enterprise expressed in personnel participation with university level studies; and 2) the *level of the international management* derived from the participation of *international capitals or managers* in the enterprise on one hand, and *exportations* in the other, as a representation of the continual link to an external network.

The hypotheses of the investigation were corroborated through the hierarchical moderating lineal multiple regression technique, where it was verified the correlation between the independent

variables through bi-variable correlation as the inflation method factor of the variance to prove that the resulting estimators of said regression were not affected by the presence of multicollinearity issues.

Results showed that ACAP positively moderates both the innovative effort of the enterprise expressed in its investment in R+D and the links that it creates through the participation in international networks. IN addition to that, it became clear that ACAP manifests itself as a key enhancing factor when the different variables with which it is estimated act as a group.

As a complement and an attempt of verifying the pervious investigation, it was proposed in this study to examine the particular case of an Argentinian SME belonging to the ICT sector, in order to evaluate the following research proposition related to each other in the simplified model shown in Figure 1:

- **Proposition 1:** A relation between the innovative effort of an enterprise (R+D) and its innovative result exists.
- **Proposition 2:** A relation between inter-organizational networks were an enterprise participates and its innovative result exists.
- **Proposition 3:** A relation between the innovative result and the competitive level of an enterprise exists.
- **Proposition 4a:** The knowledge absorptive capacity moderates the relation between the innovative effort of an enterprise and it innovative result.
- **Proposition 4b:** The capacity to absorb knowledge moderates the relation between the participation in inter-organizational networks (at the international level) where the enterprise and its innovative result are present.

Figure 14

Conceptual model based in the research propositions



4.3 Methodology

Case study allows for an investigation to maintain a holistic approach while it makes sense to real life events, just like it happens to the individual life cycles, organizational and administrative processes.

In this same sense, Piovani *et al* (2010) maintain that a case study can be addressed as an idiographic investigation, meaning like a wide and deep description of the case itself, without the purpose of having a hypothesis or theory as a starting point, not having to generalize the observations. With this approach, the enterprise “Keet Up” was analyzed, a limited liability SME founded in 2009 as a technological start-up. Located in Santa Fe, Argentina with a workforce of 10-15 employees, focused in the development of personalized software (“Software Factory”)

aimed to international and foreign clients for the most part, with an ISO certification from 2005 to 2016.

Research techniques based on a poll were used, to which an in-depth interview to the two founding partners of the association followed. In order to tackle the case study, we developed a guided questionnaire (see Annex) that both founding partners of the start-up completed. Which allowed to tour the organization starting in its foundational moment, through their growth stage and peak until a decline stage was reached. The instrument allowed to understand the structure of the enterprise, the personnel training, its products and stand out services, its main clients, type of links and innovative activities, like the obstacles and limitations that were resent during the entrepreneurial evolution.

4.4 Analysis of the “*Keet Up*” case

Though it is not the objective of this article to categorize and describe the different stages start-ups can go through, particularly those with a technological focus, they are important to understand when it comes to comprehending the synergy that generates the ACAP, the internationalization and the innovations. Two instances stand out in our case study:

4.4.1 Initial stage: foundation and growth

This Argentinian SME that produces personalized software found great success in its internationalization process during the first years of its existing, where the following aspects were highlighter:

- Innovative result

Its founders, a computer engineer and a computer analyst, knew how to take advantage of the available external knowledge and turn it into an interesting business opportunity that allowed them

a growing and fruitful international insertion with noteworthy entrepreneurial success. Back when Twitter and Facebook were starting to become massively-known platforms, these young men were able to access an open source platform that many entrepreneurs were starting to use for the creation and development of what in the following years would be known as social media. They were initially hired by a client to develop a social network for polo players, when they started to become more acquainted with the aforementioned platforms. They also acquired the necessary skills to adapt to different needs, requirements and consumer wishes, towards whom those platforms were aimed. Only one year after starting their first application, they were known in different markets as “experts in platform development”. In order to arrive to such accolade, they had adopted a novel strategy at the time: make available to the community the basic tools of their adaptation model, but generating a demand towards their enterprise when it came to personalization. This innovative use of the platform was the precursor of the “youtuber”, referencing to those that produce and manage specific contents for a client with one single platform as a base. Hence, they became examples of a particular technology, changing the profile of their project to turn it into a specialized software factory, managing to position themselves in a particular market “niche”.

- Exploitation of the inter-organizational networks

The development and utilization of this innovative strategy made the founders think about moving one step forward in their specialization, so they decided to become closer to the developers of the platforms they were personalizing. Using the resources of the inter-organizational networks (clients, universities, other vendors, financial entities and developers) they hosted an event about this type of technology in Argentina. The success of the initiative reinforced the enterprises’ profile as a “niche specialist” and its international projection. With barely a year of being operational, the

enterprise had over ten highly qualified people in its staff. Nevertheless, they were not able to satisfy the demand. To the ever growing interest in their services and the personal challenges that came with taking care of the market was added the required experience as a specialist in this applied technology. In the years that followed and as they acquired more and more experience, the networks in which they were involved allowed them to contact with potential clients (basically other start-ups). Now, they were not just developing the required products, but they were also advising in their real chance of success, which gave them a differential competitive advantage. They even developed some “inner theories” with which they justified their consulting criteria, like the “2000 user theory”, which justified to clients the maximum amount of potential users they would have if they decided not to invest in marketing.

- Knowledge absorptive capacity as an enhancing factor

From the beginning of the enterprise, the training of the human resources was one of the fundamentals pillars: the founders continued to study in post graduate programs abroad while forming a highly qualified team at home. This team was mostly comprised by a project leader and developers that had the goal to develop a product similar to a social network with an open source language. The best available professionals in the area were recruited, not just by offering great pay but with work conditions that allowed for a flexible schedule and relaxed environments. The paradigm that existed in many software companies was changed, where the developer was barely more than a needed material resource. Differentiated and personalized treatment was a factor that favored commitment and efficiency. This enterprise chose not to involve any foreign capital, nor to be able to access international experience by belonging to a multinational group. Therefore, ACAP was mainly based in the training and qualification of the enterprise’s very own human resources, which was promoted by the founders.

4.4.2. Maturity stage

By 2015, the peak of the enterprise had finished, coinciding with the life cycle of the technology in which the niche strategy was based. As it happens in these cases, the ultra-specialization advantage (“niche”) may entail the risk of exhaustion and loss of competitiveness before new products and/or services and/or technologies.

Even though “Keet Up” continued with the business model developed up until then and tried to maintain its presence in the international markets, the result was not the expected. By not counting with a differentiator or innovative element that made it stand out from other software developer enterprises, it had to accept the general model with an emphasis in the development of applications for mobile devices. In fact, the company changed its image and its name by calling itself “Keetup Mobile” and maintained its position by the good reputation acquired and the extensive clientele to which it had accessed in the first years.

Therefore, there were two differentiated stages from its inception. In the first one, product innovation allowed for it to quickly become an expert in the available technology and to create a competitive business model in the global market; the second stage, where the disappearance of the innovative result forced them to overhaul the company into offering less differentiated products/services, just like those offered by other enterprises in the area.

Neither its knowledge absorptive capacity not the inter organizational networks in which they participate have been modified in these ten years. The only difference between the first and second stage has been the existence or absence of an innovative result. It is evidenced the key factor in owning an innovative result in the development of a competitive advantage in this type of enterprises in the ICT area. Of the aforementioned propositions, the results are stipulated in Table 18, while the formerly proposed model is completed with Figure 15.

Table 18

Relation effect and result in the proposed propositions

	Relational effect	Results
Proposition 1	Positive	accepted
Proposition 2	Positive	accepted
Proposition 3	Positive	accepted
Proposition 4a	Moderating	accepted
Proposition 4b	Moderating	accepted

Source: own elaboration.

Figure 15

Result of the proposed relations in the model



4.5 Conclusions

The experience of “Keet Up” verifies in general the proposed hypothesis. It is clear that the innovative effort of an enterprise may result in a positive effect in the innovative result, whether it may be acquired quickly or over time. Said effort, centered around accessing useful external knowledge that allowed them to improve their competitiveness is clearly stimulated by the inter-organizational networks in which the enterprise participates.

It is also evidenced that the innovative result directly collaborates in the level of competitiveness of the enterprise, like it does when it comes to its international insertion. However, with the weakening of said result, the possibilities of continuing with the achieved success are greatly conditioned. It was observed that, even though the enterprise maintained a proactive energy focused in improving its ACAP, it is not enough this capacity for the enterprise to strengthen its development, particularly when it comes to international expansion.

The described case hence confirms the hypothesis of the base investigation of Agramunt and Berbel Pineda (2018) and highlight the key value of the innovation as a factor to improve international competitive of the SMEs in the software area. Furthermore, it reinforces the positive relationship between the effort in research and development and the inter-organizational networks with the innovative result, making clear the positive moderating effect of the ACAP in said process.

Regarding the applied methodology, case work, we must highlight that it resulted extremely useful to analyze a technological start-up in its real context and with the change dynamic it entails, while taking into account that it also uses the researcher’s subjective judgement in the selection and interpretation of the information. Therefore, the case study is a research qualitative methodology that has, as its main weaknesses, its limitations regarding the trustworthiness of the

results and the generalization of its conclusions, facing this way the more traditional scientific standards.

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CHAPTER 5

Conclusions

This research effectively contributes to prove the positive impact that ACAP or knowledge absorptive capacity (Cohen and Levinthal, 1990) has when it comes to the internationalization process of the SMEs, starting out with its influence in the innovative result in them, which is key to endow them with the required competitiveness to that end. Evidence emerge after an empirical study conducted in the ICT area in an economy with a lesser degree of development such as Argentina. It is precisely in the SMEs of these countries where this effect contributes with a major emphasis, given the limitations to access significant investment in research and development that allow to sustain the needed innovations.

Study number 1 proves that scientific production revised in accordance to the described methodology, and that it links the ACAP concepts and inter organizational networks, has a close relationship with the innovation and performance of the SMEs. However, the same study also exposed that there is little interest in previous research to connect said concepts with the internationalization process. It is there where a gap is detected, which is worthy to investigate. Furthermore, during the development of the study it was possible to verify that in the last five-year period (2014-2018), there was a growing tendency toward research that relate the ACAP, inter organizational networks, innovation, and performance of the SMEs, therefore leaving a vast field of development without enough exploration related to the internationalization. From this background the scientists, governments, and entrepreneurs can take advantage in order to help SMES help their international competitiveness.

To further justify the relevance of the topic in which this research is focused, it is enough to mention that it was determined that only five academic networks existed in the aforementioned five-year period where these studies had any importance, and in only two of them had a distinctly international profile: 1) the North American, Asian and European network: and 2) the Sino-

Canadian network. However, among local networks (Spanish, Chinese and British), the Spanish one was highlighted due to its production and because it was the only one with an inter-institutional profile which the other two lack, since they are more focused on their own research and study centers.

It is precisely in this framework, the Spanish inter-institutional network where this study is registered, and contributes towards filling the existent gap.

5.1. Research opportunities

Like it was previously pointed out, results obtained through the present investigation shed light into to the opportunities that exist in the field of scientific research with the objective of inquiring about two matters directly linked to the internationalization process of the SMEs, particularly those belonging to countries with a lesser degree of development: a) the role the inter organizational networks play in the strengthening of the innovative process that provides competitiveness: and b) the positive moderating role that some of the dynamic capacities of the SMEs can have, like the ACAP.

In the first of the aforementioned matters, the one related to the inter organizational networks, it is widely acknowledged its value as an enhancing factor in the international competitiveness, from which impulses towards the innovative process are created. However, it is necessary to investigate even more the reasons why the SMES can access knowledge that allows them to innovate and, in consequence, be competitive and successful in international markets, taking advantage of the aforementioned networks.

Literature proves that the way of generating innovation is accessing useful knowledge, which can be in turn developed by the impulse of the organization or by appropriating knowledge

available in the eco system. The characteristic that define the SMEs make it obvious that the first option is practically impossible to access due to the limited resources, hence the need to somehow cover the lack of capital to invest in research and development. Is in this point where the ability of the SMEs to own existing knowledge and convert it into business opportunities comes into play.

In that sense, the impact of the networks in the innovative proces has been prove to not be lineal, and that it differs according to the characteristics of each SME. Its size and internationalization level are two elements particularly important (Guler and Nerkar, 2012; Cavusgil and Knight, 2009; Zucchella and Scabini, 2007; Oviatt and McDougall, 2005; Zahra and George, 2002). The strength of a big network comes from its potential to access knowledge while the positive impact of the links between international networks turns into easier and faster access to more knowledge. (Brink, 2017; Guler and Nerkar, 2012; Zhou and Luo, 2007; Covielo and Munro, 1995).

In the second of the aforementioned aspects, ACAP, also understood as “the ability to recognize the value of new knowledge, assimilate it and turn it into a business opportunity” (Cohen and Levinthal, 1990), turns into a critical capacity as a positive moderating effect of the innovative effort, helping improve the understanding of traditional organizational learning.

ACAP entails not only the ability a SME has to value and assimilate but, complementarily, the ability of applying said knowledge that comes from an outer source into the organization itself, turning it into a business endeavor. The bigger this capacity is, the more proactive and innovative the SME will be, since it will be ready to detect and subject to research the opportunities the environment presents.

It must be taken into account the fact that ACAP, as a moderating variable, has been scarcely used by services enterprises (Jiménez *et al*, 2012) and in such cases the dependent variable

often is the result of the company's innovative effort such as it is presented in Tsai (2014); Kotabe *et al.* (2014); Kohlbacher *et al.*, (2013); Murovec and Prodan (2009); Zahra and Hayton (2008) and Lane, *et al.* (2002). Lau and Lo (2015) have researched regional systems of innovation and ACAP, arriving to the conclusion that it leads to better performance of the innovation, highlighting the fact that its use as a moderating variable is supported by previous work, even when applied to less studied areas (services).

Hence, the opportunity to inquire around the existing gap related to the relationship between the innovative effort of the SME and its innovative result as key in the internationalization process arises, in a service area scarcely studied (ICTs) of a country with a lesser degree of development where the SME finds more limitations to promote its own research and development.

To this end, two studies were composed around Argentina's ICTs area, one analyzing the area as a whole and another one based in the specific case of an enterprise belonging to the aforementioned area.

5.2. Contribution to the Literature

Study number 1 is basically a bibliometric inquiry with great detail and enough validation where it is shown that the ACAP is a key factor toward reaching top competitiveness in SMEs, and that many of them have made it easier to innovate by being able to access external knowledge. The direct consequence of this phenomenon is bigger competitiveness, which in turn becomes essential when the time comes to carry out strategies to access international markets.

This study significantly contributes to evidencing the opportunity that arises to deepen the investigations related to the subject at hand, particularly when it comes to less developed countries, where the need to enhance the innovative process of the SMEs is greater. There is a current of

interest linked to the subject matter that has even been acknowledged in global forums such as the ICSB World Conference 2015 (Arechavala, *et.al*, 2015) which also includes studies about these types of SMEs and their internationalization process, without considering the reciprocal relationship of the referred variables, meaning ACAP and inter organizational networks.

Besides, detected local and international scientific research networks that work on the study of both variables and the internationalization process of the SMEs, include countries with more developed economies or with bigger relative weight in the world order. Spain makes up one of those local networks, and given the current research was formulated from the analysis of a less developed economy and with the work of a PhD candidate belonging to it, and a local director, it counts towards the budding inter institutional collaboration that can contribute to bridge the gap, while at the same time providing the opportunity of building an international network of the subject matter to join the few that already exist.

Study number 2 analyses the positive moderating role that the ACA has in the innovative result of the SMEs starting from empirical evidence coming from a study conducted among 189 SMEs of the ICT area in Argentina. In that sense, it contributes to the research conducted in regional innovative systems and the studies over the influence of the ACAP in the innovative process results.

Even though study number 2 is based on Argentina's ICT area, the obtained results have implications that can affect the SMEs in general, like the process of designing public policies that can support the development of their competitiveness. It also contributes to corroborate the importance of favoring the training of the human capital that makes up the SME, which is how the available external knowledge gets incorporated into the organization and, in turns, generates the possibility of contributing to the innovative process. It highlights the importance that ACAP

acquires when the different variables that affect it act as a group. Results of the empirical models verify the main hypothesis, meaning how the ACA positively moderates the innovative effort of an enterprise, as well as the connections created for its participation in international networks, even when this last variable does not have a high correlation with the type of companies studied.

The hypothesis and conclusions of study number two were tested and verified in study number three, where the case of a SME belonging to that area and territory was sketched (“*Keetup*” case). Actually, it was clearly exposed by the experience of the studied SME, that the innovative effort of a SME can result in the innovative result, whether it be obtained in a quick manner or acquired in a longer period of time. Said effort, centered around accessing useful external knowledge that allow to improve its competitiveness, is clearly stimulated with the contribution of inter organizational networks in which the SME was involved. The described case confirms the hypothesis of the original research (study number two) and highlights the key value of innovation as a factor to improve the international competitiveness of the SMEs and the positive relationship of the innovative result networks, making clear how positive the moderating effect of the ACAP really is.

5.3. Recommendations for Business Practice

As a result of this investigation, and stemming from the evidence obtained from Argentina’s ICT area, there can be at least two business recommendations made towards improving the international competitiveness of the SMEs, particularly those belonging to developing economies.

First and foremost, the innovative effort of the SMEs is highly strengthened by their participation in inter organizational networks, particularly those that are international. In that

sense, SMEs must pay special attention in being favored by the “brokers” (Oviatt and Mac Dougall, 2005) that, as local governments, universities, promotional agencies, and/or entities linked with different international networks nodes, can favor the access to available external knowledge that constitute the key to the innovative process. It is likely that, in order to achieve that, some aspects of entrepreneurial culture must be modified, particularly those that focus in resource allocation, since the studies that conform this research prove the usefulness of such efforts.

Secondly, the evidence provided in the studies shows that the ACAP acts as a positive moderating factor of the innovative result that is in turn strengthened by inter organizational networks. In that sense, SMEs can find in the “gatekeepers” (Cohen and Levinthal, 1990) a substantial help to grow that skill through which channel their research and development efforts, which are by definition limited.

SMEs with the conviction of earning a place in the international markets will be able to find in these two recommendations a guide, certainly incomplete but supported by scientific evidence, to turn towards in order to improve their chances. It is obvious that a SME from a developing economy will not achieve international insertion by just understanding these two recommendations, but it is also required that other dynamic capabilities of the organization to pitch in, too. However, it has been proven how effective these recommendations can be to reach the desired goal, not only collaborating with the organization itself but also equipping them and their entrepreneurial associations with an agenda to converse with government authorities when the times comes to suggest policies that support and promote internationalization.

5.4. Limitations and Proposals for Future Research

Like all other empirical research, this work presents a series of limitations that is important to point out. First, and in relation with study number 1, which justifies the existing gap in the literature, is it noteworthy to remark the fact that even though bibliometrics do offer valuable information for research evaluation (Waltman y Noyons, 2018), it must be taken into account that the gathered data corresponds to only two sources: The Web of Science and Scopus. Even though both are prestigious and recognized in a world level, they offer limited coverage of the available scientific and academic literature. It is also important to note that there is a bias in the database towards literature in English, and that there are many publishing, authorship and citation practices that can have an influence in the study.

When it comes to the inquiry of the ICT sector in Argentina that shape study number two, results of the empirical models verify the main hypothesis, how the ACAP positively moderates the innovative effort of a SME as well as the connections created for its participation in international networks. Fieldwork is sustained by a poll, and even though the questionnaire was structured based on a previously validated scale group, it was analyzed and validated in the context of the study.

The fact that the inquiry was done over a particular context makes it important to consider in the corresponding analysis, the particulars of the area and territory. In this case, area and territory are made up by Argentinian ICTs and that determines some relevant limitations that, however, also offer the possibility of replicating the research in other up-and-coming economies, while also evaluating to what extent cultural differences (language, social conformation, legal framework, and other characteristics) affect the results of the study.

It is left as a challenge for future research the posing of new questions regarding the reciprocal effect between ACAP's moderating effect and the innovative process (Aljanabi *et al.*2014), in addition to the insertion of new members or changes in the relationships that make up the networks where the SMEs participate. The need to deepen in the verification of the relationship between the size and intensity of the connection of the nodes that shape the international networks (Oviatt and McDougall 2005, Demirkan and Demirkan 2012) has been portrayed, like the significant role of what Oviatt and McDougall (2005) called "middlemen" (brokers) and Cohen and Levintahl (1990) dubbed "gatekeepers" in the promotion of useful external knowledge for SMEs.

Study number 3 has the kind of limitations present in all studies of its kind, which are bias, the restriction to generalize conclusions and lack of representation of the whole, among others. However, it is extremely useful to test a hypothesis (Villarreal Larinaga and Landeta Rodríguez, 2010), as it was done in this opportunity. In addition to that, it must be taken into account that it allows an access for firsthand information and the understanding of the decision making process, implementation and change in the organizations with the depth that a high number of observations may probably not allow.

Therefore, the opportunity arises to inquiry about the situation of other SMEs in the same area or a different one belonging to less developed economies with which to compare the general conclusions of this research.

Each and every one of the studies in this PhD dissertation therefore presents a wide array of possibilities to maximize the usefulness of the exhibited conclusions.

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ANNEX I

Annex 1: Questionnaire about links and abilities in industrial and services enterprises

Recruitment questionnaire used in the field work

SECTION A: COMPANY INFORMATION

1.a) Business name			
b) Address (to be completed by pollster)		g) Telephone (to be completed by pollster)	
c) City (to be completed by pollster)			
h) Year of beginning of operations		d) Participation of foreign capital(%)
e) Amount of offices in the country		i) Belongs to an entrepreneurial group	No <input type="checkbox"/> Yes <input type="checkbox"/>
f) Amount of offices abroad		j) This location is the main office of the enterprise If it is not, indicate localization	No <input type="checkbox"/> Yes <input type="checkbox"/>

2. The enterprise's main activities are:

Development of:		% over sales 20XX
1) Products	a) Custom software development	%
	b) Canned software development	%
	c) Application development	%
	d) Development of software/applications parts (modules, libraries, components, etc.)	%
2) Services regarding owned products	e) Update services of owned software	%
	f) Consulting and product training (about owned products)	%
3) Services regarding third party products	g) Consulting and product training (about third-party products)	%
	h) Consulting and product training regarding the process of software development	%
4) Services	i) Placement of developers or advisors in other enterprises	%
	j) Factory	%
	k) Data Entry	%
l) Others (AI, apps, chat bots:		Addition 100 %

3. Answer based in the sections 2), 3) and 4) referring to SERVICES of the previous question.

Indicate the nature of the most important service when it comes to billing realized in 20XX.

Does not realize services

The most important service (for example, consulting or training) is:		Service
For occasional clients	a) Ad-hoc solution (non-transferable to other firms)	
	b) A solution that can be replicated in other firms	1) Market standard 2) New, innovative, own development
For a loyal client	a) Ad-hoc solution (non-transferable to other firms)	
	b) A solution that can be replicated in other firms	1) Market standard 2) New, innovative, own development

4. In which aspects does your enterprise stand out from its competitors? (Up to 5 answers).

Your Company stands out by:	
1. Your human resources	
a) Having a high production scale (a staff that can manage many important projects at a time).	
b) Counting with qualified human resources that develop with lesser spread technologies or last generation languages	
c) Counting with qualified human resources in the design of products or high complexity software	
d) Previous experience of the partners and staff	
2. Your technological resources	
e) Physical infrastructure (includes IT infrastructure)	
f) Operating with software development specific licenses (specify:.....)	
g) Having certified processes	
3. Your products/services	
i) Being specialized in a vertical segment or specific area (for example, transport, mining, supermarket software, etc.)	
j) Having products/services of certified quality	
k) Having low prices	
l) Offering pre or post sale services	
m) Product or service highly adaptable to specific demand requirements	
4. Your management and commercialization	
n) Having a wider array of national and/ or international clients	
o) Having exclusivity contracts with specific clients	
p) Having a brand positioned in the market	
5. Other (specify):	

5. Indicate the participation of your exports in the total sales of 20XX (in case of having no exports, indicate 0)

20XX exports of exclusively software products	% of total sales		First destination country	Second destination country
	%			

5.a) Indicate if your main for export product/service is (mark just one option)

Most important type of exported product		No	Yes
Canned product/ semi-canned			
Developments required by the client	As a component/ part of other software		
	As an application or complete program, custom developed		
	Bodyshop – placement of developers/advisors		
	Factory		
	Others (AI, apps, chat bots:		

SECCION B: ON DEMAND

6. Distribute the sales percentage of 20XX according to the sectorial belonging of your clients

Client type	Total	
Primary sector (agriculture, fishing, mining)	%	
Industry	Food, beverages, tobacco	%
	Machinery and equipment (including electronics)	%
	Chemistry	%
	Automotives and auto parts	%
	Process industries (petrochemical, steel)	%
	Other, specify :	%
	Services	Logistics and transportation
Software and technological services		%
Telecommunications		%
Commerce		%

6. a) Indicate in which areas your clients use your products (up to five affirmations)

Your software is used for:	Yes	No
Management and administration		
Software, services and goods development		
Logistics, transportation		
Advertising and marketing		
Electronic security		
Quality		
Buy, sell, or payment methods		
Training		
Customer service		
Other :		

	Financial services	%
	Health services	%
	Others, specify:	%
Final consumer		%
Public administration, government		%
TOTAL		100%

6.b) Indicate your main way of commercialization and the role of the intermediaries (Select just one affirmative option per table).

Commercialization type	No	Yes		Sales intermediaries	No	Yes
Direct sales (software sales as a final product)-(includes try before buy, shareware)				No intermediaries		
Software sale + account services				Software distributor		
Pay per use (sale proportional to consumption)				Integrating (through other software firms)		
Charge for downloads and/or clicks				Appstore, Android Market, E-Stores		
Licensing (used granted for a determined time)				Specialized websites, etc.		
Leasing				Other:.....		
Voluntary financing by users				...		

7. Could you point out the total amount of staff currently working or that used to work, on average, in the indicated periods? For year 20XX-20XX+2, please indicate the percentage of unionized workers.

Total staff*	20XX	20XX+1	20XX+2

*including managers/owners and agency personnel if they are actively working in the enterprise

8. Indicate the total amount of staff in your company in 20XX according to their qualification level (hired by determined or undetermined time, agency personnel, freelancers, interns).

Formal education level	Employee amount in 20XX	
Total amount of people (including managers/owners if they are actively working in the company)		a) Postgraduate completed
		b) Completed university
		c) Unfinished university
		d) Tertiary education completed
		f) Secondary education completed
		g) Primary education completed

9. a) Indicate the amount of employees in 20XX for software development tasks, according to the different specialties and then mark X with the main mode of recruitment for each role.

Specialties / Recruitment modes	Amount of employees per specialty	Undetermined contract	Short term contract	Freelancers	Agency	Other
Project leader or manager						
Requirement analyst / Functional						
Software architects / designers						
Developers						
Testers / DBA						
Other: sound, art, specialists**						

*The addition of the fields can be greater to the total amount of employees

**Specialists in the software sector by area, for example engineers, etc.

SECTION C: LINKS

10. Is the Enterprise associated to a chamber, pole or cluster? Indicate which ones

11. Indicate if there has been any link to take commercial action as a group (buying, selling, exporting, accessing new markets) in the last three years (20XX-20XX+2). Consider both formal and informal links. No Yes , complete the following table:

Agent type (mark one option per link)							Name of the linked party	Location (province)	Knowledge direction		How do you qualify the link according to the plan objective?				
Client	Vendor	Competitor or other company	Consultors	Science and technology institution (University)	Headquarters, branch, other group companies	Entrepreneurial organization (chamber)			Gave	Received	Bad -> Excellent				
											1	2	3	4	5

Note: If more links are presented for this objective, continue at the back.

12. Detail the degree to which these factors limit links.

	Little → Lots				
	1	2	3	4	5
Related to motivation					
a) Lack of interest in the company					
b) Lack of interest in the possible counterparts					
c) No counterparts that offer what the company needs are found					
d) Conflict with the counterpart regarding the protection and/or safekeeping of the results					
e) Bad previous experiences					
Related to information:					
f) Uncertainty regarding the benefits the link may provide					
g) Difficulty in finding the correct counterpart					
Related to resources:					
h) Lack of time from the firm and/or the counterpart					
i) Lack of monetary resources					
j) Lack of ideal human resources for the interaction					
Related to other factors:					
k) Administrative obstacles from the counterpart					
l) Issues to establish common goals with the counterpart					
m) Absence of intermediary agents that favor connection					
n) Other (specify).....					

SECCION D: Innovation activities

13. Were any of the following activities carried out in the enterprise (in the 20XX-20XX+2)?

ACTIVITY:	NO	YES
a) Acquisition of licenses related to products and/or new and improved processes		
b) Incorporation of generic software/ canned that implied an improvement for the company		
c) Acquisition of specific software for the company		
d) Development of specific software for the company		
e) Implementation of continual improvement programs		
f) Reverse engineering and adaptation		
g) Design of new products or processes		
h) Internal R+D: creative works realized in a systematic manner within the company to generate new knowledge		

i) External R+D: the activities mentioned in h) but realized for your company by a third party		
j) Conducted a consultancy to realize product or process innovation		
k) Training aimed toward the introduction of product and processes improvement		

14. Could you identify a group or a person within your enterprise that carries out any of the bold activities (from d) to h) mentioned in the previous question? No (skip to 22) Yes

15. If you said yes, how many people, on average, form the group?

15.a) How often are these activities conducted? Permanently According specific scenarios

15.b) Indicate if this group constitutes a formal development and research department. No (skip to 20) Yes

15.b1) Indicate the area resources for 20XX-20XX+2: % over total sales.

15.c) In case of conducting R+D internal activities: describe the development/research topic in which the team is working on:

.....

16. Indicate if there is a link for the development of R+D activities in the last three years (20XX-20XX+2). Consider both formal and informal links. No Yes , complete the following table.

Agent type (mark one option per link)							Name of the linked party	Location (province)	Knowledge direction		How do you qualify the link according to the plan objective?				
Client	Vendor	Competitor or other company	Consultors	Science and technology institution (University)	Headquarters, branch, other group companies	Entrepreneurial organization (chamber)			Gave	Received	Bad -> Excellent				
											1	2	3	4	5

Note: If more links are presented for this objective, continue at the back.

17. Indicate if the company introduced innovations between 20XX-20XX+2 and what was the novelty degree.

	No	Yes	Was a new innovation for the		
			Global market	National market	Enterprise
a) New products					
b) New services					
c) Significantly improved products					
d) New processes or with significant improvements					
e) New commercialization channels					
f) Organizational changes					

If answers "No" in a) and b), skip to 26.

17.1. Describe the most relevant product and/or service that the enterprise introduced between 20XX-20XX+2:

a) New product:

..... (ask for brochure or comment)

b) New service:

..... (ask for brochure or comment)

18. Estimate the participation of the following items in the total sales in 20XX.
(in case of not obtaining the listed results, indicate value 0 when needed)

Product or service type introduced to the market between 20XX-20XX+2	Sales % 20XX
NEW products or services created between 20XX-20XX+2	%
b) MODIFIED products or services created between 20XX-20XX+2	%
c) UNCHANGED products or services that the enterprise sold before 20XX	%
Total Sales 20XX	100%

19. Previous innovation (a) and b) in the previous question, select just one option):

- a. Allowed the company to survive against the competition No Yes
- b. Allowed the company to grow locally No Yes
- c. Allowed the company to grow internationally No Yes

20. Point out the impact of the innovation for the period 20XX-20XX+2 over the following dimensions:

	No	Yes
a) Effects over products		
Increase in the array of goods and services		
Adaptation of the products to the regulatory demands of the clients		
Specialization in niches or market segments		
b) Effects over process		
Increase of the modularization of the process		
Increase in the production capabilities		
c) Effects over performance		
Increase of the market participation		
Access to new markets		
Ratability increase		
Reduction of labor costs		
Increase of exports		

21. Point out the importance level of the following factors a hindrance for the development of innovation.

Limitations	Does not hinder → Important hindrance				
	1	2	3	4	5
High Costs					
Difficulty in accessing financing (formal restrictions)					
High financing costs (high interest rates)					
Difficulty to find qualified personnel					
Lack of information about new technologies					
Lack of information about the markets					
Uncertainty regarding new products or services demand					
The demand the company faces does not contemplate the incorporation of innovation in SSI					
Uncertainty about the evolution of Argentinian					
Danger of being copied by competitors					
Rotation of better qualified human resources					
Personnel's lack of time					
Management and/or innovation directors' lack of time					
Others, specify:					

SECTION E: Characterization of the most important product and/or service when it comes to innovation

E1) Product innovation (related to question 197, item “a”) (new products)

22. Considering your most important software innovation (new product), which is the description that best describes it in the following table?

Product type	No	Yes
It's a stand-alone app, program or web.		
It's a dependent complement of another program (plug-in, extension, module, etc.)		
It's a library (or group of libraries, or part of a library) for a third-party development		
It's a system		
It's to operate in Cloud Computing, WEB 2.0		

22. a) Indicate the platform in which your development runs:

	No	Yes
For the Web (multiplatform)		
For PC		Windows (), Linux/Unix (), Mac ()
For mobile devices/smartphones/PDA		IPhone (), Android (), Others:.....
It's for a particular hardware (consoles, ATMs, etc.)		Explain:
It is a software embedded in hardware.		Explain:

23. Point out the type of technology used in your enterprise for the development of said innovation.

Production technologies	Yes	No
Flash, xml, html, php		
XNA, Torque, Unity and other 3D engines		
C, C++, Objective-C, PAP		
COBOL , Fortran		
MySQL, SQL, Postgre		
Other:.....		

Production technologies	Yes	No
Java		
VB, .net		
Python, Perl, Ruby, LUA		
Assembly		
Smalltalk		
Other:		

E2) Service innovation (in relation to question 17, item “b”) (new services)

Doesn't offer services/ Didn't have new services in 20XX-20XX+2 , skip to next section: (SECTION F)

24. Indicate in which aspects the most innovative service the firm developed affected it

	No	Yes
Strengthened the standardization of the offered services		
Brought up the need of advancing in quality politics		
Generated the incorporation of specialized human resources		
Generated learning in the human resources		
Created new ways to use the technology with which it works		
Generated new clients		
Gave room to new ways of offering the service		
Triggered new services		
Allowed for the discovery of new technologies.		

25. Indicate if your most important service innovation affected the behavior of your client in an of the following aspects:

In your client	No	Yes	N/A
a) Did it improve the technical knowledge associated to the service your company offered?			
b) Did it increase the availability of specialized human resources?			
c) Did it improve the development degree of the integral quality management?			
d) Did the client achieved other improvements derived from the service your company provided?		Specify	

SECTION F: Capabilities

26. Indicate the organizational type according to the following activities:

26.1. For the development of new products, services or processes, you use	Never	Sometimes	Always
a) A stable group coordinated by a team leader			
b) Agile methodologies or specially formed groups for a project			
c) Assembly lines between areas			
d) Individual work			
26.2. To carry out stable consulting services (clients account) you use	Never	Sometimes	Always
a) Team-Leader coordination			
b) Agile methodologies			

26.a) In relation to the work methodology of your enterprise, point out if operational workers (for instance, developers):

Concept	Never	Sometimes	Always
a) Carry out their work in unconventional schedules			
b) Carry out their tasks in unconventional days (holidays and/or weekends)			
c) Optional home office			
d) Mandatory home office			

26.b) How do you evaluate the task compliance of the personnel?	No	On line	Fixed-time periods	At the end of a project
a) Control mechanisms are used through reports (repositories, etc.)				
b) Self-evaluation practices are applied				
c) Peer evaluation practices are applied				

27. Indicate if your enterprise has conducted training activities for its employees during 20XX-20XX+2. No Yes

28. In which areas was the training provided?	% of the personnel that got the training	Training mode	
		Internal	External
a) Improvement of the production services	%		
b) Product and services design and improvement	%		
c) Management skills	%		
d) Communicational skills	%		
e) Development	Frequently used languages in the firm	%	
	New languages for the firm	%	
f) Quality management	%		
g) Languages	%		
h) Others:.....	%		

SECCION G: Intelectual property and innovation

This section must only be completed by those that answered positively to question 17.1.a (new products).

29. Has any competitor imitated your most relevant product innovation? No Yes

30. When you consider realizing an innovation, what is your priority order?	Does consider	Low priority → High priority				
		1	2	3	4	5
Define the technology where the development will be done						
Define the client to whom the product will be sold						
Determine the form of commercialization of the product, or how it will be sold						
Complete and test the product with the most possible detail						
Explore the applicability of licenses, brands, author rights, etc.						
Define strategy to avoid being copied (explain,)						

31. Which of the following tools have you used to delay or prevent the imitation of your innovation in the last three years?

Ways of protection		Implemented		Was effective	
		Yes	No	Yes	No
Formal protection	a) Brand registration				
	b) Industrial model / Industrial design				
	c) Copyright				
	d) Utility model				
	e) Patents				
Other protection mechanisms	f) Distribution and sales network control				
	h) Exclusivity contracts with clients				
	i) Keeping key technologies secret				
	j) Systematically being the firsts in the market				
	k) Post sale services				
	l) Using marketing to limit competitor's access				
	m) Brand positioning				
	n) Process technology				
	o) Domain registry of the innovative product online				
	p) Utilizing security keys or hardware keys for the innovation				
q) Encrypting the development and the innovation to avoid reverse engineering					

32. Regarding patenting, please indicate the reasons according to your case:

32.1. In case of not having patented		
Did not patent because:	Y e s	N o
a) You never thought about patenting		
b) You did not know how to patent		
c) You considered the process troublesome		
d) You considered the costs to be too high to patent and to defend it in case of violation		
e) You didn't comply with the novelty requisite		
f) You considered too high the risk of revealing information		
g) You did the paperwork but the patent was not granted		

32.2. In case of having patented		
Patented for:	Y e s	N o
a) Avoiding copy		
b) Obtaining licenses income		
c) Strengthening your position in negotiations		
d) Blocking similar developments in competitors		
e) Increasing the reputation of your enterprise		
f) Accessing new markets		

ANNEX II

Annex 2: Publications in Journals

- Anais da Academia Brasileira de Ciências (2018). Vol. 90 (3): 3207-3221. **SJR Q1**
- Complexity (2020). Volume 2020, Article ID 7604579, 20 pages. **JCR Q2**