

The Impact of University-Firm Collaboration on Firm Performance and Regional Development

The Case of UAB and Barcelona Region

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Abstract

Research-based university-firm collaboration is a practice that is expected to contribute positively to the economic growth and development of regions. Through this collaboration, universities seek to enhance their relations with external stakeholders and their impacts on innovation and regional development, and firms aim to access valuable knowledge and to develop new and/or improved products and processes in order to survive in a global and competitive market. In the European context, governments support and promote university-firm collaboration, recognising it as a tool for the balanced and sustainable development of regions, in accordance to EU Cohesion Policy framework. This study reviews the university-firm collaboration topic and considers the case of UAB and Barcelona region for exploring how this collaboration is supporting firm performance and regional development. The role of EU Cohesion Policy in the development of university-firm collaboration and the governance of research and innovation is also discussed. Regarding the case study, results show an active role of UAB in terms of university-firm collaboration, based on outstanding research capabilities. Despite a positive impact of UAB-firm collaboration on firm performance and Barcelona region development could be assumed, its effect on innovation at firm and regional levels is not clear.

Keywords: University-Firm Collaboration; Firm Performance; Regional Development; Innovation; Cohesion Policy.

JEL: I23; O20; O30; R10; R58

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1. Introduction

The EU, through different strategies and programmes, has overseen and promoted the regional development of EU Member States basing these efforts in actions and projects with an active participation of higher education and research institutions. One of the policies framework behind these EU efforts is the European Cohesion Policy (Molle, 2007), which seeks to reduce gaps between countries and regions, as well as the generation of coordination and coherence among involved actors in economic, social and territorial terms. Therefore, it is expected that efforts towards regional development count with cohesion among governments, universities, firms and citizens regarding the practices and governance of research and innovation. University-firm collaboration is one of the most relevant practices that higher education and research institutions are pursuing with the support and promotion of governments and authorities, as it represents a path for universities to enhance their impact in regions and an opportunity for firms to improve corporate performance contributing to the development of industries and economy, and has brought the attention of academia, governments, firms and citizens to the study of phenomena such as university-firm collaboration, smart specialization and regional innovation systems.

Many universities around Europe have done big efforts in enhancing their interaction with industry and their economic impact on regions. Spin-offs (Walter *et al.*, 2006) and new-technology-based firms (NTBFs) (Lofsten & Lindelof, 2002) have arisen as tools for exploiting and commercializing knowledge created at universities. Autonomous University of Barcelona (Universitat Autònoma de Barcelona -UAB-) has not been the exception and, being one of the largest higher education institutions in Catalonia and Spain, has become a key player in a region considered as one of the most important economic and industrial hubs of Europe (Solà *et al.*, 2012). UAB, through its Research Park (Parc de Recerca, 2017) and the Spanish National Research Council (CSIC), has launched several spin-offs and NTBFs which have survived over time, as an outcome of the university effort to improve its relations with industry and its productivity in terms of patents, licenses and inventions. However, these university capabilities can also be exploited by established firms willing to commit on collaborations for product development or process improvement, for instance. Both nascent and established firms can get

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benefits from collaboration with universities, and regions where this interaction takes place should get a positive social and economic impact.

This research seeks to study the role of UAB in the innovation processes and the regional development of the region where the university activities take place, focusing on research-based university-firm collaboration. Focusing on the UAB case, innovation and governance at public university level and regional level can be explored. The paper is structured as follows: Next section (2) presents some relevant theoretical insights of university-firm collaboration; after that, (3) the UAB case is described and (4) UAB-firm collaboration is explored; finally, (5) main findings are discussed and (6) conclusions are presented.

2. Conceptual Framework

University-firm collaboration allows firms to have access to relevant knowledge and the possibility of addressing high quality research, essential for innovation in processes and products. Both universities and firms are realizing the importance of such collaboration. On one side, the agenda of higher education and research institutions have evolved along the past decade and a third mission -apart from research and education- has risen in terms of the interaction between universities and external stakeholders (Perkmann & Walsh, 2007). Universities might have a relevant role in the innovation and development of regions, and university-firm collaboration is one of the most important and visited practices for enhancing this role. Additionally, firms are recognising the importance of learning and innovating in times in which knowledge and collaboration play a fundamental role in firms' economy (Fitjar & Rodríguez-Pose, 2013). The European Union has recognised the importance of research and innovation for economic growth and social welfare with the introduction of the Horizon 2020 programme (European Commission, 2017), in which the higher education institutions take a key role in innovation and regional development (Charles, 2006). Consequently, the role of universities in societies has evolved from a traditional bidimensional perspective, with education & research as the unique missions, to a wider approach in which universities engage regionally in terms of innovation and regional development (Göransson & Brundenius, 2011). University-firm collaboration concern to universities and firms,

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because they both can gain relevant benefits from this relationship. *“Universities might enhance their third mission and enhance their impact on industries and on the economics of regions by collaborating with firms, which also leads to a better understanding of work market and commercial world for the improvement of education and research, as well as the dissemination of knowledge”* (Manrique, 2017). Meanwhile, firms can participate in internships programs, knowledge transfer activities and industrial theses; moreover, firms can innovate processes and products/services in order to enhance their performance at internal and market levels.

Public and private universities interact with public organizations (institutions) and private organizations (corporations and firms) in different ways, in which both parts work and benefit; beyond that, this interaction generates an impact on society, contributing to the development of the regions where the collaboration takes place and further away, in terms of innovation and socioeconomic development. This collaboration and its impact might work differently among several socioeconomic contexts characterized by geographical location, economic sector, firm’s size and educational system, among others. **Figure 1** is proposed to represent university-firm collaboration and its impact on regions.

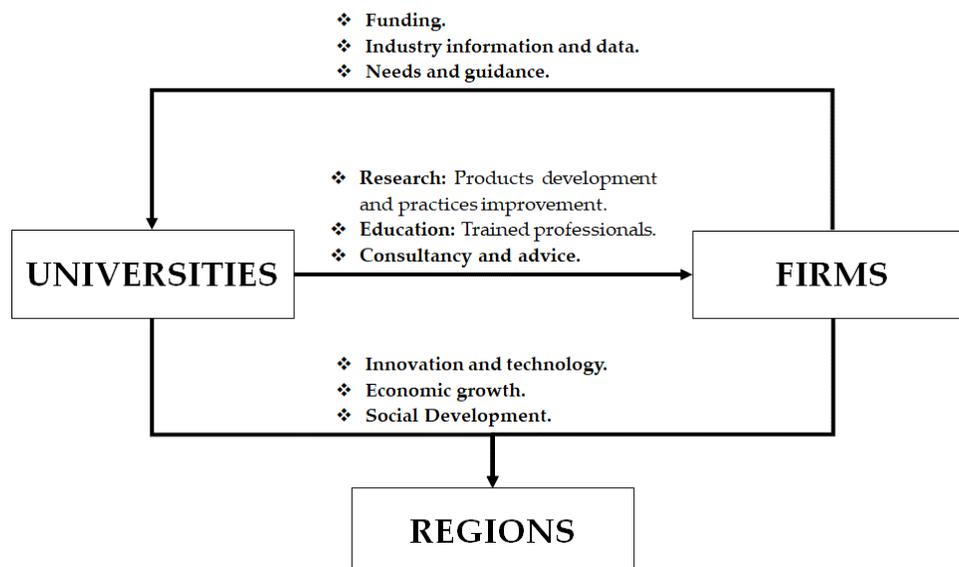


Figure 1 - Universities-Firms-Regions Interaction

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“The collaboration with university should facilitate the innovation and development of products, practices and governance at the firm level, which would in turn lead to a higher performance” (Manrique & Nguyen, 2017). Additionally, this collaboration should enhance the development of the regions where the interaction occurs. When universities, firms, institutions and citizens interact, coordination and coherence are needed to enhance the impact on regions, by tackling social, economic and territorial gaps among EU Member States, as sought by the European Cohesion Policy (European Commission, 2014). The role of university-firm collaboration and of universities themselves in peripheral and less-developed regions can generate benefits by strengthening their institutional landscape and boosting their innovation and development (Fonseca & Cinar, 2017). This anyway applies both to the case of wealthy regions like Barcelona and of certain peripheral and less-developed regions in Catalonia. The interest in the role of universities in innovation and regional development has caused a change in the conception of the innovation practices of universities, firms and authorities in countries and regions (Manrique & Nguyen, 2017), and UAB and Barcelona region have not been exempted from such phenomena.

3. Case Study Overview

This study considers UAB and Barcelona region as a representative case of university-firm collaboration in Spain and Western Europe. This section presents a general contextualization of the university and the region analysed in this paper.

3.1. Autonomous University of Barcelona (UAB)

UAB is a Spanish public higher education institution ranked amongst the 200 best universities in the world and included within the top 10 of young universities at the main university rankings. For the 2015-2016 academic year, the university counted with more than 35,000 students at undergraduate and graduate level programs, 87 bachelor degrees, 182 master degrees and 68 doctoral programmes. With a workforce of 3,676 people in teaching and research staff, and 2,348 people in administrative staff, distributed in 57 departments and 24 research centres, UAB is one of the largest employers in the region. UAB has a yearly budget of almost 312 million euros, and almost 25% of it is used for research activities (UAB, 2017). In

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2008, UAB became member of strategic alliances such as the European Consortium of Innovative Universities (ECIU) and the Alliance of 4 Universities (A4U). In 2009 UAB was recognised as a “Campus of International Excellence”, as the result of an ambitious strategic plan to transform the UAB and its surroundings into one of the most important scientific and technological poles of the Mediterranean. In research and innovation terms, the university hosts several education and research centres and institutions, as well as firms (spin-offs, start-ups, NTBFs and affiliated and derived companies).

3.2. Barcelona Region

UAB main campus is located in Cerdanyola del Vallès municipality (Vallès Occidental county). A part of Vallès Occidental county makes part of Barcelona metropolitan area in Catalonia, one of the 17 autonomous communities, which is considered a leading region economically in Spain, with 25.5% of industrial activity and 17.5% of trade operation (B30 Association, 2017), making up a 20% of national GDP. **Figure 2** shows the location of Catalonia, Barcelona region and UAB in a map.

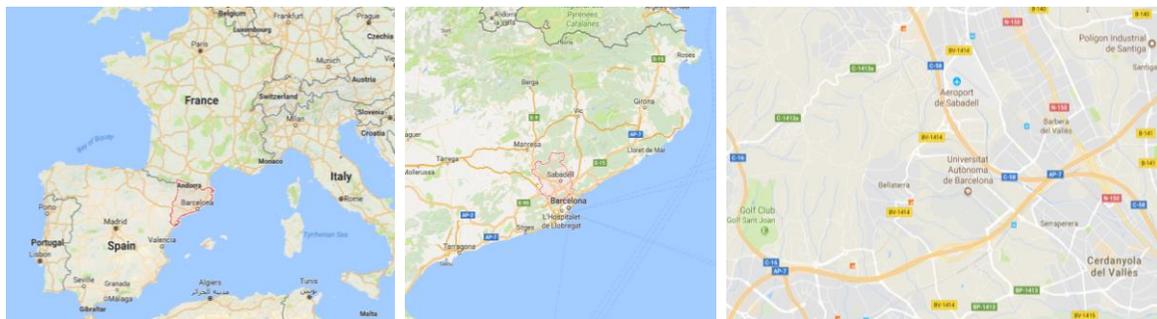


Figure 2 - Catalonia-Barcelona-UAB Location Map

Since 2012, the university is considered as part of an area named B30 that groups 23 local councils (14 from Vallès Occidental county) in the AP-7 and C-58 motorways for innovation purposes. The municipalities on this area compose a leading industrial agglomeration in Catalonia and Spain (Solà *et al.*, 2010). “B30 covers a 50km route, a surface area of 485 km² with a population of 1,018,166 habitants, and a total of 30,173 companies and 387,478 jobs with 195 industrial estates” (Manrique & Nguyen, 2017). B30 project is boosted through the economic and industrial regional policies, mainly through the Research and Innovation

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Strategy for the Smart Specialisation of Catalonia (RIS3CAT) for the 2014-2020 period (Generalitat de Catalunya, 2014). UAB main campus is outside Barcelona city, 20 km away from the capital of Barcelona province and Catalonia region. However, Barcelona city is considered the home of UAB, together with Cerdanyola del Vallès municipality. In 2009, Barcelona city council signed a document indicating its contribution to UAB plan of Campus of International Excellence.

4. Case Data & Empirics

UAB case will be empirically explored from two perspectives presented in this section: its research capabilities and its interaction with other organizations.

4.1. Research Capabilities

The scientific production of UAB, composed by articles, reviews, editorial materials and preceding papers, among others, has had an increasing behaviour during the last decade, accompanying university's growth. **Figure 3** shows the behaviour of research production, with a positive tendency especially evident after 2010 (50% increase), when the effects of specific efforts from university and faculty directives to enhance research activities started manifesting (Manrique & Nguyen, 2017); these efforts included the Research Park opening and the Campus of International Excellence development

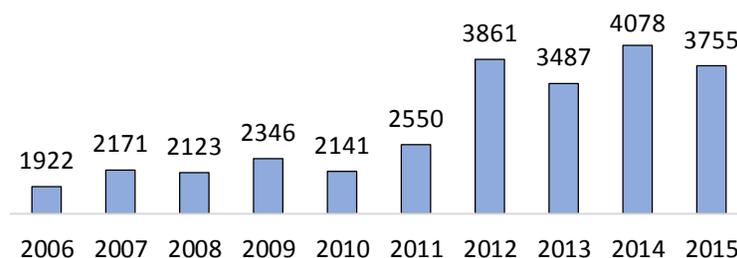


Figure 3 - Scientific Production UAB 2006-2015

With more than 3,300 items published, articles, as usual, are the most representative category in UAB scientific production along years. *"UAB has not only evolved in the scientific production size, but also in the research value and authors assertiveness"* (Manrique & Nguyen, 2017). UAB developed its research activities

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with a budget surpassing 77.8 million euros in 2015, which funding came mainly in the form of international aid, agreements and projects.

Table 1 - Research Budget Sources 2015

Type of Organization	Import	%
STATE ADMINISTRATION	€ 27,670,652.69	35.55%
FIRMS	€ 21,662,363.47	27.83%
EUROPEAN ADMINISTRATION	€ 14,108,557.61	18.12%
REGIONAL AND LOCAL ADMINISTRATION	€ 8,462,640.38	10.87%
BILLING FOR SERVICES	€ 4,947,762.63	6.36%
UNIVERSITIES	€ 990,585.73	1.27%
TOTAL	€ 77,842,562.51	100.00%

As can be seen in **Table 1**, the most relevant organizations acting as UAB funders are firms and national and European administrations, while other higher education institutions and income from billing services have minor contributions.

4.2. Interaction with Other Organizations

UAB has signed collaboration agreements with a wide range of stakeholders since 1983. The data of agreements signed by the university (UAB Data Exploitation Office, 2017) can be observed in **Figure 4**.

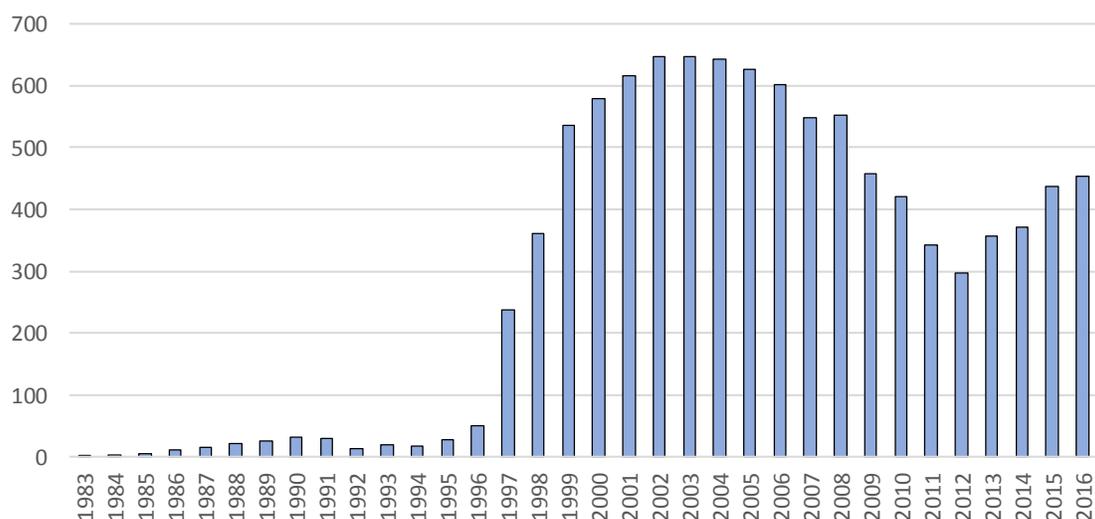


Figure 4 - UAB Signed Agreements 1983-2016

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The real boost of collaboration activities at UAB took place two decades ago. These agreements include *“research and education projects, public innovation programs, patents developments, university services provision and grants/subsidies, among others, either in the framework of university-firm collaboration or in other collaborations taking place with other region stakeholders like communities and public institutions”* (Manrique & Nguyen, 2017). On the other hand, evolution of agreements budget shows a coherent behaviour in accordance to number of agreements in the same period, with the highest budget in 2008 and a budget of over 8.5 million euros in 2016. Focusing on agreements behaviour for the 2010-2016 period, the average budget per agreement is 24,832 euros. **Figure 5** presents the annual results of this statistic, showing the highest average in 2010.

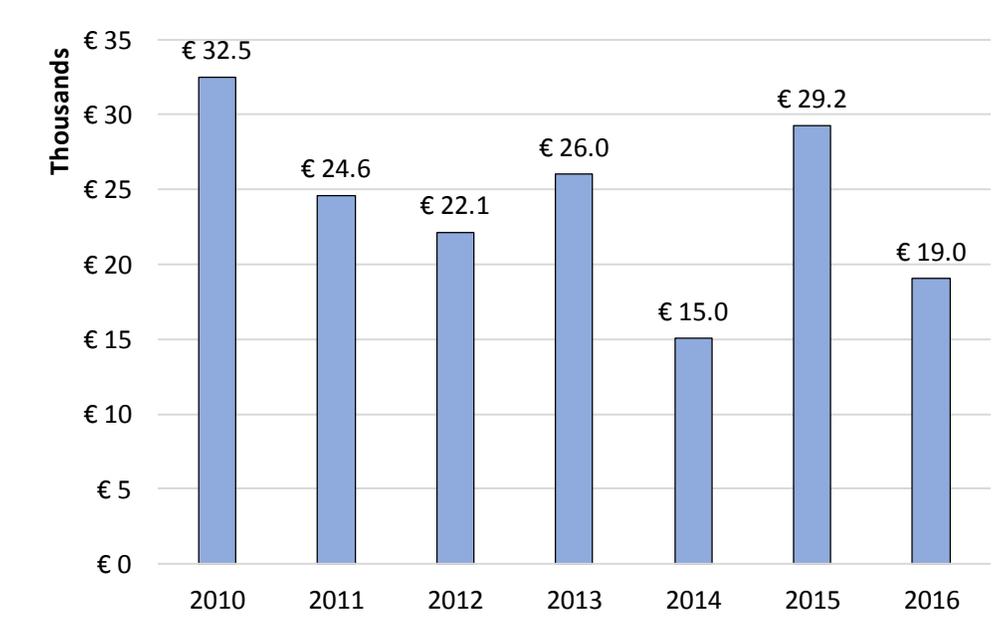


Figure 5 - Average Budget per Agreement 2010-2016

UAB has also performed collaboration activities with foreign organizations (e.g. firms, universities); **Figure 6** shows the distribution of agreements among countries. Excluding Spain (83% of agreements), the list of countries from which firms and institutions collaborate with UAB is led by American, French and Belgian organizations.

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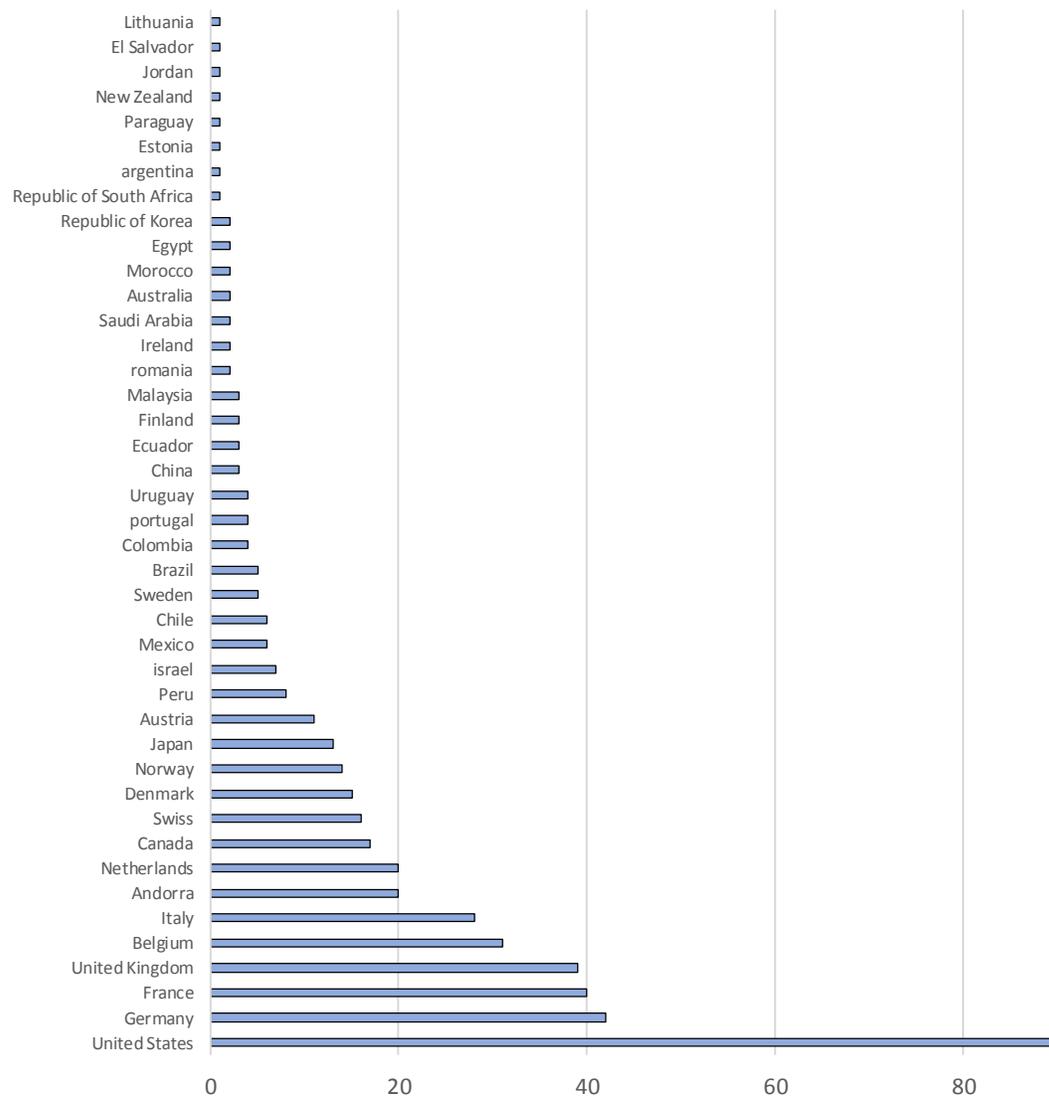


Figure 6 - Country Distribution of UAB Agreements 2010-2016

5. Discussion

UAB counts with outstanding research capabilities and results, and its active participation in university-firm collaborations has been made also evident. Regarding the region, Catalonia is one of the most advanced and industrialized regions in Spain, and the B30 area, UAB region of influence, is one the largest and most important industrial and economic agglomerations of Spain and the Mediterranean region. An active and committed university and a strong and advanced region might indicate a positive role of UAB in regional development.

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However, this is not the case for innovation. An official study from 2012 indicated that despite having a strong and advanced economy, the rates of innovation in Barcelona region were very poor (Solà *et al.*, 2010). That is, most firms located in the region could not be considered innovative in terms of product development and knowledge management. This situation might have different potential causes. Firstly, it could be that UAB-firm collaboration and UAB-industry interaction have been more focused on training activities and management practices than in the innovation of products and services. Secondly, it could be that the international orientation of UAB has caused that the most relevant efforts in term of collaborations for innovation have been taking place abroad. And thirdly, UAB collaborations, which significant growth started barely one decade ago, might need more years to show off its effect, as economic impacts of innovation, in difference with other practices, might show its results in the long term.

In regards to the relevance of **EU cohesion policy**, it is important to mention that collaboration between universities and firms would not arise without the presence of cohesion practices among these actors. Cohesion is a requirement and a main characteristic of regional innovation systems (Cooke *et al.*, 1997). Acting coordinately as a united whole, having common goals and creating synergies are cohesion practices that facilitate the emergence of innovation and university-firm collaboration, and strengthen its impact on regions development. Consequently, policy makers and practitioners working on the third mission of universities must consider the European Cohesion Policy. The reduction of gaps among EU Member States in economic, social and territorial terms, as European Cohesion Policy seeks, might be one of the outcomes of the regional development and economic growth gained through university-firm collaboration, among other practices involving higher education institutions. Policies such as RIS3CAT, in the case of Catalonia and Barcelona region, and Horizon 2020, in the European context, show that there is an alignment in the strategies and objectives about research and innovation within and among regions in Europe; that is an evidence of cohesion.

University-firm collaboration and knowledge management have become issues of interest for higher education institutions and research centres, as these can determine the sources for funding research activity (Geuna & Muscio, 2009).

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Additionally, the process of regional innovation itself needs to be governed (Heidenreich & Koschatzky, 2011), as it takes place among and within countries and regions, and it is the function of national and local authorities to drive and overcome the emerging frictions among actors in order to generate development in regions. Therefore, a relevant aspect for university-firm collaboration and its impact on firm performance and regional development is **governance** of regions, firms and universities. Governance of higher education institutions can be relevant to outline their orientation towards regional engagement and innovation, and to *“identify the willingness to collaborate with external entities such as firms and public institutions”* (Manrique, 2017).

6. Conclusion

This paper was mainly focused on two aspects: 1) the impact of UAB-firm research based collaboration on firm performance and Barcelona region development, and 2) a reflection on university-firm collaboration and its impact on regions considering the role of policies and governance.

About the first aspect, the conclusions from the case study are:

- UAB is an active and capable university in terms of research and collaboration, and Barcelona region has a strong, advanced and industrialized economy.
- A positive effect of UAB-firm collaboration on firm performance and regional development could be assumed.
- However, the effect of UAB-firm collaboration on regional and corporate innovation is not clear.

Regarding the second aspect, the study can end up with the next final remarks:

- Beyond the reduction of gaps among EU Member States, EU Cohesion Policy establishes a framework to generate coordination and alignment among governments, universities, firms and other stakeholders, to enhance the innovation and regional development at the European region in general.
- In this sense, research and innovation collaborations can be considered a tool to generate a positive impact on the economic growth and social welfare of

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regions with university-firm collaboration being one of the main expressions of research-based cooperation.

Study Limitations

This paper explores university-firm collaboration in a general way without getting in the detailed of its causes, types and impacts. This study does not provide a robust quantitative analysis about the impact of university-firm collaboration on firm performance and regional development; this impact is assumed and inferred from a conceptual perspective but it should be empirically tested in future research.

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