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**Abstract**

*Research collaboration is now the norm in the academic community. The literature has widely discussed the benefits and costs of research collaboration and compared across collaboration types (intranational, international). A discussion is still missing about collaboration in business and management as a separate discipline in the French context characterized by a separation between private business schools and public universities. The literature has rarely examined how international and intranational collaborations differ in terms of scale, scope, and impact. The purpose of this study is to address these two gaps through the notion of trade-off by using bibliometric measures of co-authorship.*

**Key words:** *collaboration in research, intranational versus international, trade-off, bibliometrics, co-author.*

## INTRODUCTION

Academic research is becoming increasingly collaborative in nature[1], characterizing the "fourth age of research" (Adams, 2013). Research collaboration takes many different forms: "internal" collaboration (within the same academic institution), "intranational" collaboration (between academic institutions within the same country), "international" collaboration (between countries), "inter-disciplinary" collaboration, and "academic-industry" collaboration (Jeong *et al.*, 2011; Kwiek, 2018; Pond, 2009).

Following this movement, studies of research collaboration have proliferated. In the literature, studies focus on analyzing and comparing the characteristics and benefits of different types of collaboration, particularly acknowledging the growing momentum of international collaboration (Chen *et al.*, 2019). However, there remain two gaps in the extant literature. First, the literature has never investigated the phenomenon of research collaboration in business and management as a separate discipline, especially in the French context. Research often focuses on the broad domains of engineering and social sciences (e.g. Wuchty *et al.*, 2007) in individual countries such as Italy, the Netherlands, and the US, or in groups of countries such as EU members. The French system of management research is very special, as it is characterized by the historical separation between private business schools and public universities (Menger *et al.*, 2015; Mangematin and Belkhouja, 2015; Dubois and Walsh, 2017). Research collaboration in such a unique context is well worth investigation. Second, the literature has rarely compared the scale, scope, and impact of international and intranational collaborations (Kwiek, 2020a). Importantly, it has never gone as far as examining whether there is a trade-off between these two types of collaboration. Specifically, it

[1] Among JSTOR-indexed articles, the prevalence of coauthored articles rose from about 6% in 1900 to over 60% in 2011 (West *et al.,* 2013); among Web of Science–indexed articles, the current prevalence is even greater: 75% (Wuchty *et al.*, 2007).

has not explained whether international research collaboration takes place as an alternative option or an additional option of national collaborations, i.e. whether researchers "sacrifice" the one type to focus more on the other type, or if they can simultaneously engage in both. This issue merits attention because the resources devoted to research activity are limited. According to trade-off theory and the resource-based view, research institutions have to privilege certain types of collaboration among all available options in allocating their resources, and consequently influence researchers' collaboration behavior. This trade-off starts to have preliminary evidence, as shown in the study of Kwiek (2020b), which indicates a strong increase in international collaboration with a decrease in intranational collaboration in 24 EU Member States from 2009 to 2018.

The purpose of this paper is to fill these two gaps. We do so by studying the scale, scope, and impact of international and intranational research collaborations between organizations in the (specific) field of Business and Management in France. Inspired by the theory of trade-offs as expressed by the resource-based view, we go further to examine whether there is a trade-off between these two types of collaboration in this field. We consider the French field of Business and Management research as being structured by three broad types of institutions: private business schools (BS), public universities, including research teams from CNRS (Univ-CNRS), and other private or public research institutions such as INRA or INSERM (Others). Using a data set from Scopus, we examine the research collaboration activities of French researchers by relying on bibliometric measures of co-authorship, i.e. the number of publications and the affiliations of those publications' authors.

Our paper is organized as follows. The first section discusses the extant literature on research collaboration and highlights the current gaps. It also introduces the trade-offs theory and the resource-based view as theoretical frameworks inspiring us to understand the relationship between international and national collaborations. The second section presents our research questions. In

Section 3, we detail our methodology and data analysis. We present our findings in Sections 4 and 5. The paper ends with a discussion and a conclusion.

## RESEARCH COLLABORATION AMONG UNIVERSITIES AND OTHER HIGHER EDUCATION INSTITUTIONS: LITERATURE REVIEW AND CURRENT GAPS

The literature has discussed different forms of research collaboration, examining their determinants, characteristics, and beneficial outcomes. In this discussion, two types of collaboration, intranational and international, are of interest to our study.

### Intranational collaboration

Intranational collaboration is defined as that between a university researcher and another partner from another academic institution within the same country (Landry *et al.*, 1996). From an empirical perspective, evidence shows that it contributes to increasing the publication and citation volumes of the participating researchers (Landry *et al.*, 1996). Among different types of research collaboration, intranational collaboration is expected to be the most resistant to change and the most stable type. This is because national collaboration is significantly embedded in strong intranational scientific ties. Nonetheless, based on a study of 24 EU Member States from 2009 to 2018 (Kwiek, 2020b), it is found that intranational collaboration decreased by 0.5 percentage points during the study period.

Related to intranational collaboration is collaboration between public and private research sectors, i.e. between academic institutions and corporations. Scholars argue that the boundaries between them have become blurred and their activities increasingly overlap. This is often illustrated by such concepts as academic capitalism and entrepreneurial universities (Slaughter and Leslie, 1997; Etzkowitz *et al.*, 2000). Empirical studies confirm that there is an increase in research

collaboration between academic and industrial organizations using a range of methodology, from patent citations analysis of nanoscale technologies (Meyer, 2000), to scientific publications (Ponds, 2009) and questionnaires on academic patentees (Meyer *et al.*, 2003).

**International collaboration**

International collaboration involves co-authors from two or more countries. This form of collaboration is increasingly common. For example, in the US, the share of publications with authors from multiple countries increased from 8% to 20% between 1988 and 2005 (Xie and Killewald, 2012); research teams with authors from four or more countries represent the fastest growing mode of scholarship (Hsiehchen *et al.*, 2015). In Europe, the percentage of European academics collaborating internationally in research is 63.8%, which is very high (Kwiek, 2018).

The literature on international collaboration has expanded most rapidly (Chen *et al.*, 2019). It has attracted so much interest that there are now several systematic reviews of this expanding research domain (eg., Katz and Martin, 1997; Bozeman and Boardman, 2014). It is found that international collaboration is driven by financial and attentional resources, academic excellence, individual motivation, and active informal communication among researchers (Jeong, Choi and Kim, 2014). The patterns of international collaboration differ across disciplines and geographical regions. For example, soft sciences such as sociology and psychology tend to be more local than hard sciences such as chemistry and mathematics (Kwiek, 2018). The US, the UK, and France are generally the three countries with the highest level of international collaboration (Zitt *et al.*, 2000). In terms of effects, international collaboration is particularly beneficial in terms of visibility, which can be seen through citation frequencies (Sooryamoorthy, 2009). This is because it not only offers access to scarce or unique resources in other countries (Zhao *et al.*, 2013) but also provides a means to seek complementary capabilities (Franceschet and Constantini, 2010).

**Intranational versus international research collaboration: the current gaps**

Due to the diversity of research collaboration, the literature has tried to explain why individual researchers prefer collaboration over individual research. One argument is that research collaboration increases productivity, thus having a positive effect on the number of publications of researchers (Lee and Bozeman, 2005). Empirical studies confirm that collaborative teams, especially from the US, produce more highly cited work than individual authors (Lee and Bozeman, 2005; Wuchty *et al.*, 2007). Another argument is that collaboration enhances visibility of results. Thanks to the greater number of co-authors, the article is brought to the attention of a larger number of researchers through personal contacts (Franceschet and Constantini, 2010). As a result, research collaboration is believed to lead to a faster diffusion of scientific knowledge (Singh, 2005). Finally, collaboration allows us to cope better with the increasing specialization in science, with multidisciplinary approaches, and with the complexity of scientific instruments (Franceschet and Constantini, 2010). Individual researchers can, therefore, improve personal competencies and eventually ensure career advancement (Abramo *et al.*, 2014).

However, despite the rich insights brought by extant studies, there are two important gaps in the literature. First, the current literature lacks an investigation specific to business and management as a separate discipline. Studies often cover a wide range of disciplines, in which business and management research is included under the banner of social sciences (e.g. Kyvik and Reymert, 2017; Lewis *et al.*, 2012; Wuchty *et al.*, 2007). Some studies focus exclusively on science and engineering, such as that of Ponds (2009) and Lee and Bozeman (2005). This gap is worth investigation because academics in different parts of the academy do not collaborate in the same way. Researchers involved in disciplines in need of expensive equipment such as physics have higher incentives to collaborate (Landry *et al.*, 1996), while the tendency is to research alone and

produce sole authored publications in humanities disciplines such as history and literature (Lewis *et al.*, 2012).

Moreover, we know from the literature that national and international research collaboration has developed remarkably among researchers in Italy (Franceschet and Constantini, 2010), the Netherlands (Ponds, 2009), the United States (Lee and Bozeman, 2005), Norway (Kyvik and Reymert, 2017), and Australia (Lewis *et al.*, 2012). But the French context, which is marked by a historical separation between private business schools and public universities (Picavet, 2007), is very specific. Historically there was a clear distinction in terms of mission between public universities and private business schools: research is the responsibility of universities and vocational training the mission of business schools (Courpasson and Guedri, 2007). This tradition had led to a concentration of management research in universities: the presidents of scientific management associations or the editors of academic management journals were mainly academics, the main research laboratories were affiliated with universities and many of them were linked to the CNRS[2]. By contrast, in the past, the BS had not paid much attention to research, except for a very few BS such as HEC and ESSEC (Blanchard, 2011). During the 2000s, a real cultural change started to take place among business schools (Abdessemed and Bueno-Merino, 2016). At the international level, they started applying for accreditations such as AACSB and EQUIS to ensure external recognition. These accreditation agencies focus on scientific publication and the qualification of professors in their evaluation criteria. At the national level, the CEFDG (Commission for the Evaluation of Training and Management Diplomas) also put forward the same criteria in its evaluation for the granting of the "Master's degree" to business schools (CEFDG, 2005). Since then, French business schools have invested significantly in research at the national

[2] Centre National de la Recherche Scientifique.

and international levels (Menger *et al.*, 2015; Mangematin and Belkhouja, 2015; Dubois and Walsh, 2017). In this historical context, one may question whether research collaboration may take place across private business schools and public universities.

Second, the literature has not paid significant attention to the differences between intranational and international research collaboration in terms of scale, scope, and impact (Kwiek, 2020a). The only study addressing this issue is that of Kwiek (2020b). It finds that during the period of 2009-2018, the growth in publications in major European systems is almost entirely attributable to internationally co-authored papers, as the volume of publication based on intranational collaboration decreases. In addition, although it is widely believed and empirically shown that research collaboration means higher publishing rates and higher citation rates, very few studies compare such an impact between these two types of collaboration. One study is that of Narin and Whitlow (1990) in Europe, which shows that internationally co-authored papers receive twice as many citations as domestic papers. Likewise, van Raan (1998) and Oh *et al.* (2010), based on their investigation in the Netherland and Korea, also prove that internationally co-authored papers have a higher impact than domestically co-authored and single-authored papers.

Importantly, there is potential to go further in the analysis to examine the trade-offs between these two types of research collaboration, as discussed in the following section.

**Trade-offs theory and resource-based view**

The work of Kwiek (2020b) shows that the consistent growth of international research collaboration in Europe comes at the expense of a decline in intranational collaborations. It is possible that researchers have to "sacrifice" one type of collaboration to devote their time and effort to the other type. This is because these two types of collaborations are necessarily different. Each specific collaboration mode depends on informal communication, cultural proximity, academic

excellence, external fund inspiration, and technology development levels (Jeong *et al.*, 2014). International collaboration involves foreign researchers, its key audience is the international research community, while national collaboration is more related to the local one. Research internationalization divides the academic community, both across institutions and across faculties within institutions, as those who do not collaborate internationally are likely to suffer disadvantage in terms of resources and prestige (Kwiek, 2020a).

The resource-based view of the firm can shed light on this possible relationship between these two types of collaboration. It has built up a useful approach for determining the volume and destination of the main intangible organizational resources, in particular those at the foundations of its competitive advantages (Barney, 1991; Penrose, 1958; Wernerfelt, 1984). At the analytical core of this approach is the notion of trade-off, which provides a simple model of allocating rare resources to alternative investments. When the amount of intangible resources dedicated to a particular activity increases, that of other activities decreases, all other things being equal. For example, the seminal work by March (1991) considers the balanced relation between the exploration of new possibilities and the exploitation of old opportunities (becoming certainties) in the context in organizational learning. The theory of trade-offs offers a model to consider the choice of alternative options. Each trade-off in a particular time period can be summarized by a decreasing curve. According to the cost and value provided by each of the two options the organization will choose the mix that gives the best economic outcomes. This approach based on the notion of compromise (another term for trade-off) has strong implications for a relevant understanding of the distribution of knowledge investment costs and benefits across time and space in all types of organizations.

In the context of research collaboration, higher education institutions can be considered as learning organizations, which are subject to organizational trade-offs between different research

activities and projects. As collaboration is of crucial importance in the fourth age of research, they have to invest resources to deploy that activity and create specific capabilities. At the level of individual researchers, there is a trade-off because the available working time is necessarily limited (even if one works at night). At the level of the research team, the annual budget is fixed per year. As a team and its members cannot exceed its budget in the short term, their activities are limited over one year. Therefore, modeling the research collaboration behavior of individual researchers and the research team through the notion of trade-off is reasonable. Intranational and international collaborations are two important alternatives that they have to consider through the model of trade-off. Each option needs specific resources and requests particular capabilities, leading to a necessary choice of one type over another in the context of limited resources for research. This relationship can be depicted in the diagram below (Figure 1).

It should be noted that the process of selection on a trade-off relation is sometimes considered as inadequate due to the static properties of the model linked to the assumption of all things being equal otherwise. Nevertheless, when the time dimension is considered (if the assumption of all things being equal otherwise is lifted), the curve that delineated the trade-off can shift. For instance, when the volume of the research budget increases, becomes possible to increase the amount of the two alternative capabilities with respect to their past value (see Figure 1). But it remains true that one option is still considered as relatively more important than the other. In the context of our study, we conjecture that international research collaboration is a much more considered option than the national one, although the amount of national collaboration continues to scale up under the effect of the growth of the BS research budget over time.

**INSERT Figure 1**

## RESEARCH QUESTION: RESEARCH COLLABORATION IN THE BUSINESS AND MANAGEMENT FIELD IN FRANCE

Based on the above theoretical insights, we contribute to the literature by investigating the following issues. First, we examine intranational research collaboration in the field of Business and Management in France. In this way, we study a particular discipline and in a specific country, which has not been considered in depth in the literature. We can see whether the fourth age model of research takes place in the discipline of Business and Management, in the particular context of France, where academic institutions are economically and historically separated. Second, we compare the scale, scope, and impact of intranational and international research collaboration among researchers in business and management in France. We also go further to examine whether a trade-off between these two types of collaboration takes place. By doing so, our study enriches the preliminary empirical support to the observation that intra-national collaboration would decline due to a significant increase in international collaboration (Kwieck, 2020b). We contribute by putting forward the notion of trade-off between intranational collaboration and international collaboration.

### Methodology and data set

#### *Sample of research organizations*

Our period of study is from 2008 to 2018. Due to the specificity of the French context, we consider three groups of institutions in our analysis. They include:

- The Business Schools (BS hereafter) group. It is composed of 38 BS which appear in the annual rankings of the national press (*L'Etudiant*, *Le Figaro*, *Le Point*, and *Le Parisien*). Two BS were withdrawn from our analysis: one BS for which only information about publications in 2018 was available (South Champagne BS), another which had very few

publications and which, moreover, were scattered over time (ISTEC). We therefore worked on 36 BS. As there has been a strong merger movement between French BS over the last ten years, we adopted the convention of reconstituting the data of the merged schools' publications over the entire period of 2008-2018, based on their structure in 2018.

- The public universities and the CNRS (Univ-CNRS hereafter) group. Separating the CNRS from the universities to form two groups of large public research establishments would not be relevant since many research teams are composed of members from the two types of institution. They constitute the so-called "Unité mixte".
- The groups of other institutions (Others hereafter). Alongside business schools and universities there is a third group of institutions, which participate in the production of new knowledge in the field of business and management: engineering schools (e.g. Ecole Centrale, Ecole des Arts et des Métiers), public research institutes (e.g. INRA, INSERM, INRIA), private business schools which are not members of the "Conférences des Grandes écoles" (INSEAD), Institutes of Political Studies, Monetary institutions (e.g. Banque de France), etc. Although these institutions do not constitute a coherent group, they cannot be ignored given their significant contribution to management research.

**Our basic methodological assumption**

We follow a bibliometric approach to investigate the research activities of individuals and teams. If the bibliometric measurement of research performance is common in "hard" scientific disciplines, it is much more recent in the social and human sciences, and still not widely used in management disciplines. This approach is appropriate for studying the research model based on collaboration leading to publications by co-authors (Jones *et al.*, 2008). The underlying assumption is that research activity is measured based on publications as outcomes (the outputs of research)

rather than on the research process (e.g. investment in research). A co-authored publication represents a research collaboration. Author affiliations allow us to know the type of collaboration (Kwiek, 2020b). A publication is considered to be the result of an international collaboration when there is at least a foreign affiliation in the signature. A publication is from an intranational collaboration when there are affiliations from at least two different groups of institutions presented above. A measurement of inputs (research expenditure or salaries of faculty) would be desirable but it is difficult to obtain the relevant information at the individual level. It should be noted that we are not interested in the so-called applied research that leads to publications in professional journals but in academic research that results in publications in peer-reviewed journals.

**The data set**

We built a database of academic publications via Scopus, which provides a picture of the production of new knowledge in business and management in the 2008-2018 period of time. Scopus is a transdisciplinary database launched by publisher Elsevier in 2004. It references 21,000 scientific journals (including open access titles). We chose it over Web Science because it offers more coverage of the humanities and social sciences and French journals. Journal articles belonging to the "Business, Management and Accounting" field in the Scopus database are extracted. To make sure that only publications in the Business and Management discipline are included, we removed economics journals and added finance journals that were not listed in the Scopus "Business, Management and Accounting" field. Our final database includes 1,177 journals. From these academic journals, we extracted the articles published between 2008 and 2018 when they have in their signature at least one affiliation in France. We thus obtained 15,546 articles with 37,392 different affiliations, of which 21,998 affiliations are located in France. Among the French affiliations, we first identified the ones related to BS, which constitutes the first group of research

institutions in our study. Among the remaining affiliations, we found those related to a university or the CNRS (Univ-CNRS), the second group of institutions in our study. The remaining French affiliations are classified into the third group "Others". Affiliations outside France are classified as foreign affiliations. To calculate the volumes of articles associated with each of the three groups and the evolution of these volumes over the years, we adopted a simple counting rule: when an affiliation is found to be associated with one of the three groups of research institutions, the article is attributed to that group. This means that a paper can be assigned to more than one group.

We calculated the volumes of articles related to each of the three groups of French research institutions in the field of management and their evolution. Over the entire period of 2008-2018, the Univ-CNRS group has the highest level of publications (Table 1). Nevertheless, the progression of BS publications is remarkable. The number of their publications grew four times during the period of observation, while that of the Univ-CNRS group only doubled. In 2018, the two groups achieved practically the same amount of publications (862 against 891). The publications of the Others group are on an increasing trend, but progression is slow.

**INSERT Table 1**

With bibliometric information, we are able to identify different types of collaboration: 1) collaboration inside a single institution, 2) collaboration within a group of institutions (for instance collaboration between two BS), 3) collaboration between the three groups of institutions (for instance collaboration between a particular BS and a university), 4) international collaboration related to a group of institutions, 5) collaboration between the groups of institutions plus an international collaboration. All these types of collaboration are summarized in Table 2. In Table 2 it is important to note that Monopub publications are different from individual ones. In the former,

there is one institution with affiliation to one or multiple authors. In the latter, the institutions of affiliation belong to the same group of institutions studied in this paper (BS, Univ-CNRS, or Others).

**INSERT Table 2.**

We examined the impact of collaborative research by measuring the impact of co-authored publications. We followed Didegah and Thelwall (2013) arguing that in the context of Social Sciences research, the Journal Impact Factor is statistically significantly associated with increased citations. The Journal Impact Factor is a means for measuring how much a co-authored publications is impactful, and thus, if a collaboration is impactful. We classified the articles of our data set according to the visibility indicator of the journal in which they appear. We did so by using the 2018 SCImago Journal Rank Best Quartile (https://www.scimagojr.com/). This indicator allows articles to be classified into four groups: from the group being published in journals with the highest impact – the first quartile (Q1) – to the groups being published in the "least visible" journals – the last quartile (Q4). We calculated the number and proportion of articles present in each of the four groups. We use two approaches to impact measurement in each paper:

- An analysis based on descriptive statistics: we classify each paper into the quartiles of the distribution, and then retain only the proportion of papers published in journals with the highest impact - the first quartile
- We use the impact factor of the journal in which the paper is released as a quantitative continuous variable of the "value" of the paper (Impact factor of the Journal) in our econometric analysis. It is not an optimal measure of the impact of a paper. The statistics of citations would certainly be better but require a large period of time after the publication of the articles to be efficient, which is not possible with our data.

## THE STEADY GROWTH IN PRIVATE BS/PUBLIC UNIVERSITY RESEARCH COLLABORATIONS: SCALE, SCOPE, AND IMPACT

In this section, we delineate the trends related to the scale, the scope, and the impact of research collaboration among the three groups of research institutions in France in the period 2008-2018.

### Collaboration in research: scale and scope

The increase in research collaboration can be pictured through the evolution of the number of papers having only one author. Over the entire period studied, the average proportion of papers with a single author is 28%. The number was around 40% at the beginning of the period. Its regression is quasi monotone and regular. This trend also exists in other disciplines (Wuchty *et al.*, 2007), marking a clear evolution toward co-publication and therefore toward the "fourth age of research" (Adams, 2013). It is important to note that this pattern holds true for all three groups of institutions in our study, with BS having the smallest amount of lone author papers and the group Univ-CNRS having the highest one (almost 20%).

In terms of intranational collaboration, our data show that there is research collaboration between the three groups of institutions. The total amount of co-authored papers is about 2,618, accounting for 17% of all published papers. The number of collaborative papers between BS and the Univ-CNRS group reaches 1,109 over the entire period of study. The group of Others has a lower volume of co-publications. There is also an asymmetry in the partnership of the collaboration process: the Univ-CNRS group constitutes (by far) the strongest partner of the BS group, but the reverse is not true; the strongest partner of the Univ-CNRS group is the Others group.

The times series (see Figure 2) reveals an interesting trend. Overall, the collaborations increase over time, but the trend is not continuous, despite the fact that the total amount of publications of each group of institutions increases persistently over the period of study. We can see that

collaboration between the three groups of institutions reached a peak in 2014-2015 and then started to slow down. An inverted U-shape relationship with respect to time would fit well with the data. From 2015, the number of BS co-publications with the University-CNRS group exceeds that of University-CNRS with the other institutions.

**INSERT Figure 2.**

In terms of international collaborations, Figure 3 displays the scale of international collaboration across three groups of institutions and how it evolves over time.

**INSERT Figure 3.**

From Figure 2, three interesting results emerge. First, for each group there is a clear general increasing trend in favor of international publication, thus confirming what the literature tells us: a progression of international research collaborations. Second, the three groups of institutions are not at the same level of international collaboration: BS are much more internationalized in terms of collaboration, the University-CNRS group has the weakest (albeit increasing) level. Third, there is a clear consistent jump in the rate of international collaboration between 2008 and 2018, especially for the University-CNRS group (+ 48%) and to a lesser extent for the BS group (+ 26%). This result can be a likely explanation for the slight decline in intranational collaboration between the three groups of institutions observed previously. Fewer collaborations with other national institutions seem to be offset by more collaborations with foreign institutions. It follows that during the period of 2008-2018, the management of research collaboration is rather heterogeneous: growth then decline in intranational collaboration and, particularly in the last part of the period, growth in international collaboration.

When we compare the level of international collaboration common to at least two groups of institutions and the level of international collaboration of each of the two groups taken in isolation, the former is generally lower than the latter. For example, the joint BS and Univ-CNRS publications have an internationalization rate of 33% on average over the entire period of 2008-2018, which is lower than the international collaboration rate of BS alone (61.1%) and that of the Univ-CNRS group alone (38.8%)[3]. On average over the period of 2008-2018, collaboration between the three groups is less internationalized than all the publications of each of the three groups taken in isolation. This reinforces the idea that one could analyze research collaboration between groups as a substitute for collaboration with foreign institutions.

**Impact of research collaboration**

We assess the benefits of research collaboration thanks to the metrics related to the impacts of collaborative papers. Based on our methodology, the proportion of papers published in the first quartile journals (Q1) provides a first insight into the value of publications of each group of institutions and therefore of research collaborations.

**INSERT Table 3**

Table 3 provides the impact of publications resulting from different types of research. Regarding the publications of each group of institutions, the first three lines give the proportion of publications and the proportion of international publications in the first quartile of academic journals (the Total column and the International Publications column respectively). The numbers show that international publications have more impact than the overall set of publications of each group. The last three lines present the impact of papers stemming from intranational collaboration (the Total

[3] Collaboration between BS and the group of Others is internationalized on average over the period at the 35.1% level.

column) and that of papers stemming from international collaboration and intranational collaboration combined together (International Publications column).

The intranational collaboration of BS produces a smaller proportion of publications in the quartile of top-ranked journals than the overall publications of BS (53.7% versus 58.7%). This is not the case with the intranational publications of the University-CNRS group. For researchers in this group, publishing with institutions from the other two groups increases the probability of having a publication in a journal with a higher impact factor (42.9% versus 53.7% and 48.6%). Publications from international collaboration always have a stronger impact than those from intranational collaboration. The benefit of international collaboration is most significant for the University-CNRS group: while 42.9% of their publications are found in the first quartile journals, having at least one international affiliation pushes this number to 56.7%; if there are partners from the Others group joining the international collaboration, the number is 59.8%. Therefore, the University-CNRS group seems to be the big winner in collaborative practices.

Based on the results of this section, we can draw two major observations. First, researchers increasingly collaborate over time, despite being from institutions with different status (private versus public) and a historical separation. The drivers of these research collaborations have been highlighted in the literature: greater visibility/value of collaborative publications (for at least one of the institutions) which benefit researchers and their institutions. Second, during the period of study, there is a loss of momentum in intranational collaboration while the number of international collaborations accelerates (in line with the statistical results by Kwiek, 2020b). We can see a shift in the behavior of researchers, showing stronger international collaboration and weaker intranational collaboration over time. This evidence supports our idea of a trade-off.

**Multivariate analysis: the trade-off evidenced and explained**

As presented in the previous section, the number of intranational collaborations started to decline after 2014-15. In addition, after 2013, there was a flagrant jump in the number of international publications coming after a long period of continuous growth. These observations suggest that international collaboration takes place to the detriment of intranational collaborations. Therefore, we test the existence of a trade-off between intranational collaboration and international collaboration. To say that there is a trade-off between the number of intra-national collaborations and the number of international collaborations at the level of an agent or a group of agents means that the relationship between the two variables has a negative slope. Consequently, our econometric strategy is as follows: we estimate a relationship between these two variables. Our choice was to consider a model that explains not the number of international collaborations but its probability, which can be explained by variables describing whether there is collaboration between institutions and at the level of each publication.

We estimate the coefficients related to our main explanative variables determining the probability that a publication is international. Because the volume of intranational collaboration increased in the first period (until 2014) and then decreased, two Probit models are estimated, one for each period: 2008-2014, 2015-2018. In this way we can check if there are differences between the two time periods. In order to also control for the short time effects, we add dummies for each year. We know from descriptive statistics analysis that international collaboration generates publications with a stronger impact. To isolate the effects of intranational collaborations, we control for the effects linked to value through a dummy variable indicating if a paper is published in the first quartile of academic journals (ranked according to their impact factor). Due to strong collinearities many other variables we expected to include in the regressions have been withdrawn. Table 4 provides the results of this analysis. While the pseudo R square is small, the quality of estimations is good. The coefficients related to intranational collaboration are always negative and

significant in the two periods. It means that the occurrence of collaboration between types of research institutions has a negative impact on the possibility to collaborate with foreign researchers. This analysis confirms that there is a decreasing relationship between intranational collaboration and international collaboration for the two periods. While always collaborating with another group of institutions, researchers move toward collaborating with foreign researchers. Nevertheless, they are weaker in the first than in the second period. It indicates that the effects of the move on the trade-off are stronger in the second period in which the volume of interinstitutional collaborations decreases.

**INSERT Table 4**

The trade-off between intranational and international collaboration can be explained by the higher impact of a paper resulting from an international collaboration in comparison with the impacts of intranational collaboration. As a consequence, researchers and their institutions, being motivated to publish in better journals, consider international collaboration as a good choice. In order to validate this explanation, we proceed as follows. We estimate an equation explaining the impact of a paper and we include as exogenous variables the various forms of collaboration (with other control variables). As far as an endogenous variable is concerned (the impact of a paper), we choose the impact factor of the journal in which the paper has been published as a relevant measure[4]. Regarding the exogenous variables, overall we have 15 variables (see Table 1 in the methodology section).

[4] In the literature the citations to a paper are considered as a good index of paper value. Nevertheless, we recall that, according to Didegah and Thelwall (2013), in the context of Social Sciences research, the Journal Impact Factor is statistically significantly associated with increased citations. As a result, the two indexes (Journal Impact Factor and citations level) can be considered as equivalent.

According to the econometric results presented in Table 5, only the variables related to an international collaboration are statistically significant. The explanative power of the others on the impact of any paper is null. There are two exceptions regarding the publications related to the University/CNRS group (Monopub and Individual). The sign of these two variables is very significantly negative. As a consequence, such papers have a significant lower impact compared to the other papers. Importantly, our analysis provides a very clear message: only pure international collaborations (without any national collaboration) or international collaboration coupled to inter-institution collaborations are related to papers with a higher impact. The estimated coefficients related to the international collaboration of a single group of institutions are always higher than or equal to the coefficients related to papers resulting from combined intranational collaboration and international collaboration.

**INSERT Table 5.**

## DISCUSSION AND CONCLUSION

Our paper started with a premise that there are two gaps in the literature on research collaboration. The first is about research collaboration in the Business and Management discipline in the French context, which is characterized by a historical separation between private Business Schools and public Universities. The second involves the comparison between intranational and international collaboration in terms of scale, scope, impact, and the trade-off between them. We address these gaps by using a bibliometric approach to examine publications of French research institutions, which are referenced in the Scopus database. The three groups of institutions in our study include the Business Schools, the universities, including researchers affiliated to CNRS, and other institutions such as INRA and INSERM. The period of study is from 2008 to 2018. Our study brings new insights to the literature as follows.

In terms of intranational collaboration, our findings show that the three groups of institutions increasingly collaborate with each other. Collaboration between BS and Univ-CNRS is significant despite the historical separation between them and their differences in terms of their institutional status. As far as Business and Management research is concerned Univ-CNRS becomes the closest national partner of BS. However, when we split the period under observation into two periods (before and after 2014), we found a change in the pattern of intranational collaboration. The first period experiences an increase in intranational collaborations, while the second experiences a (weak) decrease. In terms of international collaboration, there is clearly an important growth among the three groups of institutions in our study, albeit at different levels. Among these, the BS group has the highest level of international collaboration. We went further than a simple comparison between intranational and international collaboration to examine whether there is a trade-off between them. Our analysis confirms that researchers and research teams in France tend to forsake intranational collaboration for international collaboration. The latter increases at the expense of the former, which particularly decreases from 2015. An explanation for this trend is the costs (in terms of time, coordination, and resources) associated with adopting simultaneously two types of collaboration. Regarding the effects of collaborative research on the impact of publications (a proxy for the value of research), the probability that a given publication is published in journals in the first quartile of journals with the highest impact factors decreases when it results from collaboration between two groups of institutions. In addition, publications based on international collaboration always have a stronger impact than those from intranational collaboration. This analysis implies that intranational collaboration in France is less valuable in terms of publication impact than international collaboration. It explains why international collaboration grows rapidly in the field under observation (this trend is general as noted by Kwieck, 2020b).

Based on these results, our study provides the following implications. First, despite the traditional duality between public universities and private BS in France, researchers from these two groups of institutions do collaborate with each other. This is a good sign showing that intranational research collaboration in the French management landscape exists, representing a prerequisite for stronger French management research. Historically, the Shanghai ranking, published in 2003, which was truly an earthquake which attacked the national pride related to France's "grandes écoles", triggered the discussion in favor of a closer relationship between the two groups of institutions. François Goulard (2006), in an article entitled "Universités, grandes écoles, rapprochez-vous !" published in Le Monde, argued that public universities are well equipped to compete at the international level thanks to their size, geographical location, program diversity, and research heritage. When universities and private business schools ally with each other, France can climb up the ladder at the international level. The results of our study show that this ambition is possible, as intranational research collaboration is not unthinkable in France.

On the other hand, international collaboration brings publications with stronger impact and it may be beneficial for scholars to turn to international collaboration for more visibility in the international community. Collaborating internationally enhances researchers' academic prestige, scientific recognition, and access to research funding (Kwiek, 2020a). However, as there is a trade-off between intranational and international collaboration, there is a possibility that researchers will continue to privilege the latter over the former. In the long term, this trend will lead to a stratification between international researchers and national ones (Kwiek, 2019) and thus create an internal division within the French management landscape. Given the historical distinction between public universities and private BS, which has been considered as a disease which is slowly destroying the French society (Fauconnier, 2006), this potential stratification is not desirable. It follows that funding agencies, policy makers, universities, and private business schools should

develop appropriate policies regarding intranational and international research collaboration. While international collaboration should be encouraged, intranational collaboration should not be neglected. Importantly, we often forget the costs of researcher collaboration, and often view it as a good thing that should be universally facilitated (Katz and Martin, 1997). While considering research collaboration policies, a symmetrical approach should be adopted to evaluate not only benefits, but also costs (Katz and Martin, 1997). It happens that one may outweigh another. The development of such policies needs to incorporate these factors rather than simply providing financial incentives and introducing regulatory requirements.

While our study has provided valuable insights into intranational and international research collaboration in the management discipline in France, there is potential to improve the analysis further. We are aware that we have to use with caution the methodology of trade-offs as a guide for achieving the organizational resource allocation to various uses. The decision maker has to adequately appreciate the interactions among multiple resources and their interactions with the environment. As stated by Teng and Cummings (2002), a focus on one resource or capability, or on one approach exclusively, may lead to ignoring critical complementary resources and capabilities. In our study, there may be reciprocal relations between national and international research collaboration. For instance, national collaboration can provide the opportunity to find a potential foreign co-author, and international collaboration can make a team more visible and thus give it more chance to find national co-authors. A second limit of a trade-off relation is related to its static properties (the assumption of all things being equal otherwise). For instance, when the research budget increases, it becomes possible to increase resources dedicated to the two alternatives, although one option remains more important than the other.

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**Figure 1. Trade-off between intranational and international collaboration**

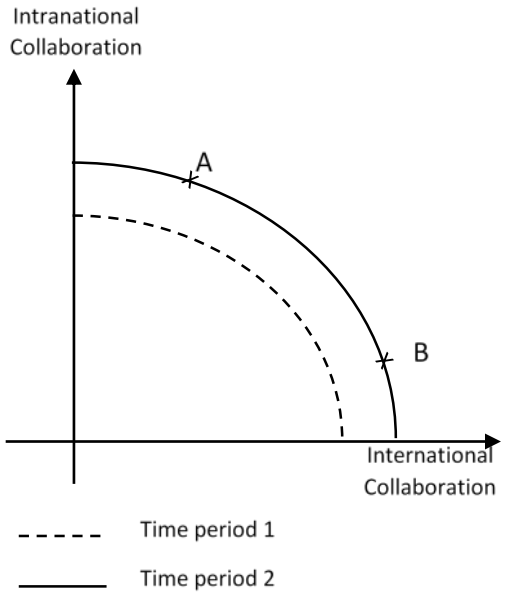


**Table 1. Overall publications by groups of institutions**

| Year | Total | BS | Univ-CNRS | Others |
|---|---|---|---|---|
| **2008** | 899 | 222 | 442 | 352 |
| **2018** | 1 871 | 862 | 891 | 391 |
| **Total** | **15,494** | **6,192** | **7,614** | **4,255** |

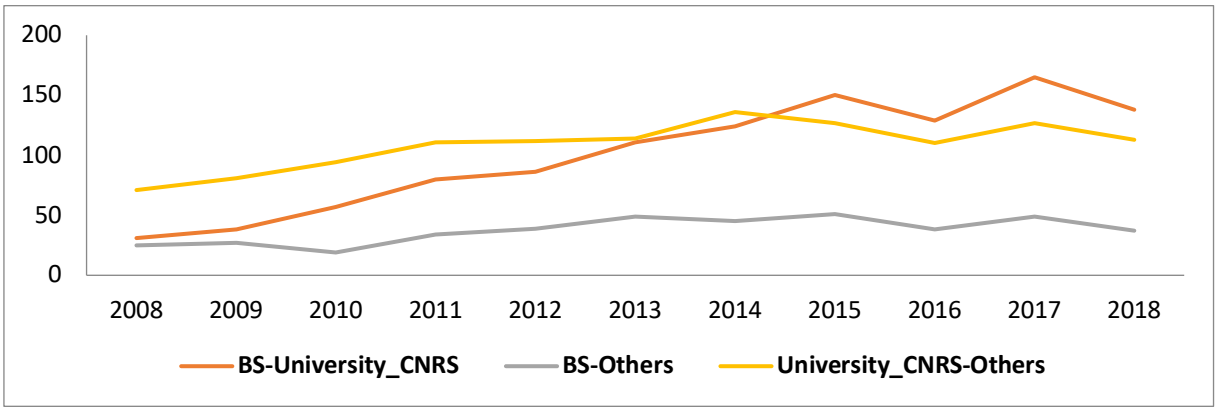
*Source*: Scopus and our calculus.

**Table 2. List of variables related to research collaboration**

| Variables | Definition | Proportion in the sample (%) |
|---|---|---|
| **monopub_BS** | paper related to a BS (with one or multiple authors) | 26.8 |
| **monopub_Univ-CNRS** | paper related to an institution of the Univ-CNRS group (with one or multiple authors) | 26.6 |
| **monopub_Others** | paper related to an institution from the Others group (with one or multiple authors) | 15.5 |
| **Individual paper BS** | paper with one author or multiple authors from institutions within the BS group | 9.6 |
| **Individual paper Univ-CNRS** | paper with one author or multiple authors from institutions within the Univ-CNRS group | 20.5 |
| **Individual paper Others** | paper with one author or multiple authors from institutions within the Others group | 8.2 |
| **collab_BS_others** | paper resulting from collaboration between BS and other institutions | 1.2 |

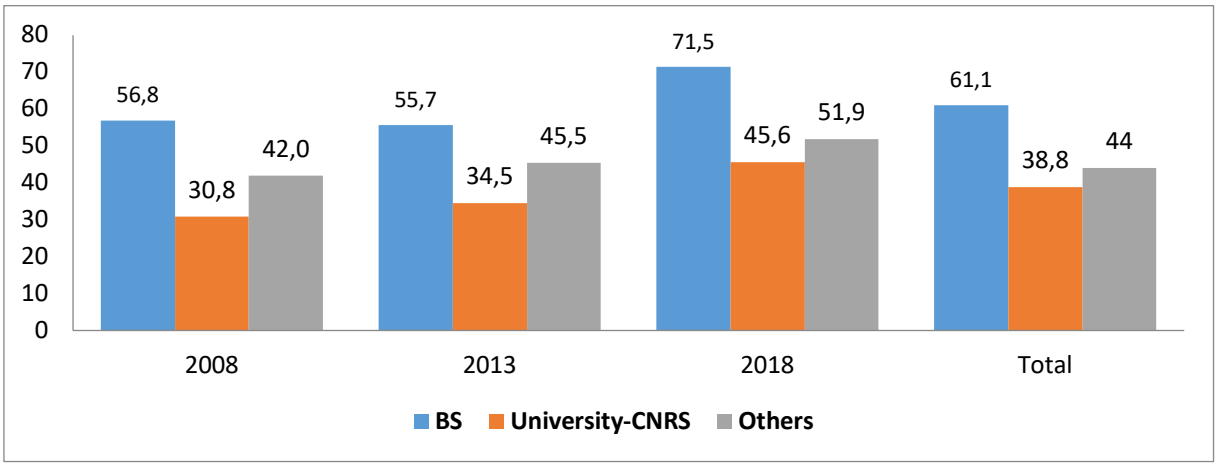
| | | |
|---|---|---|
| **collab_Univ_others** | paper resulting from collaboration between Univ-CNRS and other institutions | 4.9 |
| **collab_BS_Univ** | paper resulting from collaboration between BS and Univ-CNRS | 4.3 |
| **collab_internat_BS** | paper resulting from international collaboration and BS | 21.4 |
| **collab_internat_Univ** | paper resulting from international collaboration and Univ-CNRS | 14.6 |
| **collab_internat_Others** | paper resulting from international collaboration and Others | 9.7 |
| **collab_BS_others with internat** | paper resulting from collaboration between BS and other institutions and international researchers | 0.7 |
| **collab_Univ_others with internat** | paper resulting from collaboration between Univ-CNRS and other institutions and international researchers | 2.1 |
| **collab_BS_Univ with internat** | paper resulting from collaboration between BS and Univ-CNRS and international researchers | 2.2 |

**Figure 2. Collaboration between the three groups of institutions: evolution**




*Source:* Scopus and our calculus.

**Figure 3. Proportion of international publications by group of institutions and year**




*Source*: Scopus and our calculus.

**Table 3. Proportion of publications in the first quartile of academic journals**

| | Total | International Publications |
|---|---|---|
| **BS** | 58.7% | 68.2% |
| **Univ_CNRS** | 42.9% | 56.7% |
| **Others** | 46.7% | 59.8% |
| | | |
| **BS/Univ_CNRS** | 53.7% | 66.7% |
| **BS/Others** | 50.4% | 68.2% |
| **Univ_CNRS/Others** | 48.6% | 59.8% |

*Source:* Scopus and our calculus.

**Table 4. Probability a publication results from an international collaboration**

| | | Probability a publication results from an international collaboration | |
|---|---|---|---|
| | | **2008-2014** | **2015-2018** |
| **Independent variables** | **collab_BS_univ** | -0.511836***<br>(0.0621429) | -0.6477885***<br>(0.0582499) |
| | **collab_BS_others** | -0.1745483*<br>(0.0892492) | -0.3286331***<br>(0.1048352) |
| | **collab_univ_others** | -0.5499715***<br>(0.0544266) | -0.6337501***<br>(0.064808) |
| | **Quartile** | -0.4134809***<br>(0.0151325) | -0.416532***<br>(0.0182596) |
| | **Dummies for years** | Yes | Yes |
| | **Const.** | 0.8093051***<br>(0.0424747) | 1.081869***<br>(0.0438546) |
| | **N. of observations** | 8,108 | 6,563 |
| | **LR chi2(10)** | 1007.29 | 808 .64 |
| | **Prob > chi2** | 0.0000 | 0.0000 |

| | | | |
|---|---|---|---|
| | **Log likelihood** | -5085.4397 | -4053.7023 |
| | **Pseudo R square** | 0.0901 | 0.0907 |

Robust standard errors in brackets, *** p<0.001, ** p<0.01, * p<0.05.

**Table 5. The determinants of paper impact**

| **Dependent variable** | **Impact_factor of the Journal** |
|---|---|
| monopub_Autres | 0.124<br>(0.109) |
| monopub_BS | 0.060<br>(0.080) |
| monopub_UnivCNRS | -0.117**<br>(0.059) |
| Individuel_Autres | -0.190<br>(0.120) |
| Individuel_BS | -0.032<br>(0.098) |
| Individuel_UnivCNRS | -0.363***<br>(0.051) |
| collab_entre_typeseuleBSUniv | -0.044<br>(0.093) |
| collab_entre_typeseuleBSAutre | 0.143<br>(0.148) |
| collab_entre_type_seule_UnivAut | 0.008<br>(0.090) |
| collab_internat_seule_BS | 0.795***<br>(0.099) |
| collab_internat_seule_Univ | 0.518***<br>(0.053) |
| collab_internat_seule_Autres | 0.988***<br>(0.125) |
| collab_entre_type_et_collab_internat_BS_Autres | 0.886***<br>(0.183) |
| collab_entre_type_et_collab_internat_Univ_Autres | 0.215*<br>(0.119) |
| collab_entre_type_et_collab_internat_BS_Univ | 0.583***<br>(0.118) |
| Constant | 1.057***<br>(0.072) |
| Years dummies | Yes |
| Obs. | 17 836 |
| R-squared | 0.072 |
| Prob > F | 0.0000 |

Robust standard errors in brackets, *** p<0.001, ** p<0.01, * p<0.05.