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Coopetition as an Innovation Strategy in the European Union: Analysis of the German Case

ABSTRACT

The aim of this article is to provide an in-depth examination of the relationship between coopetition and innovation in the European context. After examining the main findings in the literature on the subject, the article analyses the data from the Eurostat Community Innovation Survey (CIS2012), in Germany, and conducts a quantitative study associating coopetition and innovation with a view to observing how cooperative companies perform in the field of innovation and what characteristics they have. Amongst other findings, the results yield a certain relationship between international coopetition and cooperation with international clients in the public sector, and also governments and international universities, while at the same time showing less interest in collaborating with private partners when coopeting on a domestic level. The size of the firm, the location of the partners or the percentage of employees with a university degree, are just some of the factors that are incorporated into the analysis.

KEY WORDS: Coopetition, innovation, collaboration, EU, Germany, networks

1. INTRODUCTION

The literature on innovation indicates that, in recent years, a systematic and fundamental change has occurred in the way that companies undertake innovative activities. To be specific, there has been a huge growth in the use of networks with external companies of all sizes (Hagedoorn, 2002; Zeng, Xie, & Tam, 2010). Furthermore, in what Chesborough (2006) refers to as the Era of Open Innovation, companies augment their external innovation sources and the use of a wider range of knowledge and resource networks, which have become indispensable when creating successful innovations.

The apparently paradoxical collaboration with competitors or coopeition in horizontal relations between organisations, (Brandenburger & Nalebuff, 1996), encouraging collaboration at certain stages of the product's life cycle, or in certain technical or production areas, has become a strategic imperative for companies in the world of network businesses. This phenomenon also occurs in cooperation with small and medium-sized enterprises (SMEs) (Iturrioz et al., 2015) and has also started to become popular in both the business area and the academic literature (Hamel, Doz, & Prahalad, 1989; Ritala & Hurmelinna-Laukkanen, 2009). Although it is usually considered that cost-saving, access to and exchange of resources, a greater creation of value and the encouragement that promotes innovation are potential advantages in a coepetitive strategy (Czernek & Czakon, 2016; Le Roy & Czakon, 2016), there is still very little empirical research available into the effects of coopeition on the performance of company innovation (Park, Srivastava, & Gnyawali, 2014; Walley, 2007; Yami, Castaldo, Dagnino, & Le Roy, 2010).

In their extensive review of the literature, Bouncken, Gast, Kraus & Bogers (2015) pinpointed three main areas where new future research efforts are necessary in the field of coopeition: 1) Increasing the number of quantitative empirical studies (at the time of their analysis, only 17 of the 82 studies analysed had applied quantitative methods, the rest were merely conceptual analyses or presented a qualitative approach); 2) Increase the understanding of the context and the environment in which coopeition takes place, and explicitly mention the need for further research that links coopeition with the SME, recently established and family business. 3) Extending the knowledge about the background and implications of coopeition for innovation, especially with regard to the different types of innovation. A quantitative study associating coopeition and innovation and that shows interest in the role of the size and other characteristics of coopeition companies would thus amount to a threefold contribution in helping to cover the aforementioned research gaps.

Along these lines, current studies that relate the performances of innovation and coopeition provide mixed evidence: some studies show a positive relationship between coopeition and innovation, in the case of the product (Belderbos, Carree, & Lokshin, 2004; Neyens, Faems, & Sels, 2010), whereas other authors have observed a negative relationship (Nieto & Santamaria, 2007). Following through with this debate, some studies (Gnyawali et al., 2008) suggests high levels of competition and cooperation can improve innovation performance, whereas some others are revealing (e.g., Bengtsson, Eriksson & Wincent, 2010b) that the performance of innovation might suffer owing to greater tension as a consequence of the major contradictions and dualities inherent to such relationships (Gnyawali, Madhavan, He, & Bengtsson, 2012).

We find ourselves in a study area where, as we shall see, little research has been done and that yields contradictory findings: the area of the relationship between innovation and coopeition. Therefore, in this article we ask ourselves the following research question: How does a coepetitive company perform in the field of innovation and what characteristics does it have. With a view to answering this, we will conduct an analysis based upon the Eurostat CIS survey concerning innovation in the EU, which amongst other questions, asks about coopeition of the European companies, and we will focus on the German case.

The article is structured in the following way: after the introduction, Section 2 will briefly run through the literature that has researched into coopetition, placing special emphasis on the coopetition-innovation binomial. Section 3 describes the methodology and the data that are the subject of the study. Section 4 develops the empirical analysis and shows the findings obtained, while the article ends with the conclusions in Section 5, which also considers the limitations of the study and future lines of research.

2. LINKING COOPETITION AND INNOVATION: BRIEF LITERATURE REVIEW

Firstly, the coopetition study keeps open the debate about its definition (Ketchen et al., 2004; Bengtsson and Kock, 2014; Dorn et al., 2016) in spite of the increasing pre-eminence that coopetition is acquiring in the management literature. In our article, we assume, along general lines, that the concept of coopetition refers to the relationship between companies that simultaneously involves competition and cooperation (Mention, 2011). Cooperation with rivals generally arises out of the compliance with new regulatory restrictions or standards in the industry (Nakamura, 2003) or as a result of the willingness to share risks and cost, by searching for synergic effects, in many cases through a combination of R&D resources (Das & Teng, 2000; Huang et al., 2009).

As far as the actors involved are concerned, cooperation can occur between companies (Bouncken et al., 2015) including suppliers, clients or supplementary firms (Afuah, 2004; Brandenburger & Nalebuff, 1996; Zineldin, 2004), within companies themselves (Luo, Slotegraaf, & Pan, 2006), and between companies and other institutions, such as universities (Baglieri, 2009). Bouncken et al. (2015) also conduct an exhaustive sectorial review to observe the impact of coopetition in the different types of industries, and also in the area of services. If we refer to the size of the firms (Gnyawali & Park, 2001), only a limited number of studies have explicitly focused on the possible contributions made by coopetition in the field of SMEs (Levy et al., 2003; Robert et al. 2009; Thomason et al. 2013; Morris et al. 2007), although coopetition could have major benefits on these companies (Bouncken, Claußb & Fredrich, 2016). And particularly, associated with innovation in the small enterprise, empirical evidence has been already found of a positive correlation between coopetition and innovation in SMEs (Quintana Garcia & Benavides Velasco, 2004; Najib and Kiminami, 2011), whereas other authors have not found any significant evidence (De Propriis, 2002; Freel & Harrison 2006).

With respect to the question of motivation, the academic literature establishes that the main driving force behind coopetition is the quest for some kind of competitive advantage, e.g., through accessing resources or via innovation means (Velu, 2016; Bengtsson & Kock, 2014; Raza-Ullah, Bengtsson, & Kock, 2014). In this sense, one of the driving forces for applying coopetition strategies is product innovation (Ritala and Hurmelinna-Laukkanen, 2009; Gnyawali & Park, 2009, 2011), and coopetition becomes a viable strategy for encouraging the development of these new products and launching them onto the market (Estrada, Faems & de Faria, 2016; Gnyawali & Park, 2009, 2011; Ritala & Hurmelinna-Laukkanen, 2009; Yami et al., 2010). This quest for a competitive edge has also been analysed from the perspective of the company's position and the characteristics of the

exchange network, not only from a learning viewpoint but also from a knowledge exchange perspective (Powell, Koput, & Smith-Doerr, 1996; Gnyawali & Madhavan, 2001). Other authors have also shown interest in the mechanisms for capturing created value (Chen, 1996; Emden, Calantone & Droge, 2006), applying a "resource-based view" to the capacities involved.

According to Park, Srivastava & Gnyawali (2014), the benefits obtained by cooptition is also a subject that has not been examined a lot. The lack of a clear coordination between specific mechanisms through which benefits can be obtained by applying cooptitive strategies, limits progress in researching into cooptition. Three primary mechanisms based on previous research work can be identified (Park, 2011; Srivastava, Bruyaka & Gnyawali, 2012) through which companies generate associated benefits of cooptition that can also be linked to innovation (Park, Srivastava & Gnyawali, 2014): i) co-development with partners ii) purchasing the partners' resources, and iii) improving internal innovation efforts through external resources or those of the partners.

A review like the one carried out by Dorn, Schweiger & Albers (2016) establishes five multilevel research areas in this new discipline: 1) the nature of the relationship, 2) governance and management, 3) leaving the relationship, 4) the characteristics of the partners and 5) the environmental characteristics. Cooptition would appear in the literature associated with the dynamics of the transformation of knowledge (Werner, Dickson, & Hyde, 2015), owing to its importance in the supply chains (Wood, 2012) and as one of the key strategies of the 21st Century (Yami et al., 2010). This complex relationship between competition and collaboration poses a whole range of questions regarding its emergence and its conservation, indicated for example, with regard to the distance from the client and the heterogeneous nature of the resources (Bengtsson & Kock, 2000).

2.1 On cooptitive innovation

Cooperation networks based upon innovation take in a heterogeneous group of different people and bodies, including representatives from companies, universities, organisations, technological centres, including clients, providers, and also competitors (Kamalian et al., 2015; Pekkarinen and Harmaakorpi, 2006; Hadjimanolis, 1999). After the work done by Ritala & Hurmelinna-Laukkanen (2009) major and specific contributions have been published about the relationship between innovation and cooptition (Granata et al., 2016; Ritala & Hurmelinna-Laukkanen, 2013; Velu, 2016; Wemmer, Emrich & Koenigstorfer, 2016) and four areas of intersection have been pinpointed between cooptition and innovation in literature (Ritala et al., 2016) including cause-effect dynamics (consequences for the results of the innovation), processes and practices (tensions and interaction), strategy (creation of and appropriation of value) and integration (network and ecosystem innovation).

In general, there is consensus that cooptition can improve innovation because partners achieve an increase in market power, the complementarity of the resources and the risk sharing (Gnyawali & Park, 2011; Quintana-Garcia y Benavides-Velasco, 2004; Ritala, Hurmelinna-Laukkanen, & Blomqvist, 2009). and this leads to greater creativity and innovation due to the ability to find integrating and synergic solutions (Gnyawali, Madhavan,

He & Bengtsson, 2016) including synergies through joint R&D (Osarenkhoe, 2010; Walley, 2007).

In contrast, certain authors show a degree of distrust: Fernandez, Le Roy & Chiambaretto (2017) consider that the impact of cooperation on performance of innovation is still controversial, and it is still necessary to understand how coepetition affects innovative business models (Dorn et al., 2016). Some studies have concluded that the impact of coepetition is greater for incremental innovation than for radical innovation (Ritala, 2012; Bouncken et al., 2017), whereas other studies have demonstrated the opposite (Bouncken & Fredrich, 2012).

Le Roy, Robert & Lasch (2016) added a new dimension in the relationship between coepetition and inter-organisational innovation: the location of the coepetitor. Although they find arguments to justify the positive effect of the geographical proximity of the companies on innovation and entrepreneurship, in general (Audretsch & Feldman, 1996; Porter, 1998; Lasch et al., 2013), this relationship would not appear to be valid for coepetition in product innovation processes (Staber, 2007; Lee, 2009; Gnyawaly & Park, 2011). This finding means that the geographical dimension (location) is an interesting subject for study in order to obtain a better understanding of coepetition strategies for innovation. The findings from our analysis give greater insight into this field.

In SMEs, where internal innovation potential is limited because most of the effort and resources are given over to the product and its commercialisation, co-creation and collaboration through partners or innovation collaboration networks are especially important (Lipparini & Sobrero 1994; de Propriis, 2002), so it is interesting to analyse with whom the developing occurs and what results are obtained, including the competitors and their coepetitive dynamics. According to Tomlinson & Fai (2013), coepetition is becoming popularised through the model proposed by several Italian industrialists and their concept of "innovative environment" where mutual interdependence, trust and reciprocity are essential characteristics, and "collective learning" is promoted in order to enhance innovative performance (Becattini, 1990; Camagni, 1991; Maillat, 1995; Bellandi, 2003). In more general terms, it has been accepted that this type of horizontal cooperation between SMEs can speed up the development of products, provide scale economies and mitigate the risk associated with a lack of resources for R&D and technology, enabling them to compete against bigger players (Winch, Bianchi, 2006; Morris, Kocak, & Özer 2007). Nevertheless, coepetitive cooperation introduces the risk of technology escaping to rivals and a loss of control over the innovation process. All of this means that an assessment ought to be made to see if it is really worthwhile facing up to the challenges involved in managing these types of relationships (Tomlinson & Fai, 2013).

Other research works incorporate new study variables, e.g., heterogeneity or technological life cycles (Czakon, Mucha-Kus & Rogalski, 2014). These authors include in their systematic review of literature, an invitation to carry out new researchs into the exogenous factors that prompt company managers to practice coepetition.

3. DATA SAMPLE & METHODOLOGY

This article utilizes data from the Community Innovation Survey (CIS) by Eurostat, based on innovation statistics that are a part of the science and technology statistics data from the EU. The surveys are conducted biannually and for this article we have applied data for the EU from CIS 2012, covering the 3-year period 2010 to 2012. At the moment of closing this research, this is the latest version of the survey for which universities and research bodies have microdata to conduct the analysis that can be requested from Eurostat. The CIS survey has already been used in some of its waves to study coopetition (i.e. CIS 04 for the French case, in Le Roy, Robert & Lasch, 2016)

The CIS was initially designed to cover technical aspects of product and process innovation. As the releases progressed, the survey has incorporated questions concerning collaboration in innovation, and especially with competitors in the heart of the cooperation arrangement for product and process innovation. To be specific, the dichotomous variables: CO41 Cooperation agreement with competitors (National), CO42 Cooperation agreement with competitors (EU/EFTA/EU-CC), CO43 Cooperation agreement with competitors (US), CO44 Cooperation agreement with competitors (China or India), and CO45 Cooperation agreement with competitors (Other countries).

CIS 2012 supplies a set of general information about firms (industry, business group, volume of business, geographical markets); information about innovation (of product, process, marketing and organizational); the factors that complicate innovation activities; as well as the objectives of innovation. This inquiry also provides data about the identification of the kind of partners with which the firms cooperate and their location. The description of the different variables utilized in this study can be seen in Appendix A.

In order to carry out the analysis we have compiled and processed the data provided by the CIS 2012 to ensure comparability across countries. The final sample size is of $n=96,056$ records. The sample space is therefore formed by the samples per country. We have reviewed the data in depth to ensure consistency, and have avoided inconsistencies in various variables. At first, every country constituted one data frame with 82 variables.

Before carrying out the in-depth analysis of the variables, we observed that many of them were variables where the inputs were lost values (NA), so they will not be providing any information. It can be seen how, with the exception of Germany, most countries have many variables with a large amount of NAs, often more than 80% NAs, so we decided to concentrate our analysis on Germany (DE). Therefore, our sample space is Germany ($N=6329$).

The analysis method is simple but solid. We prepare contingency tables relating CO41, CO42, CO43, CO44 and CO45 with the rest of the variables, but do not find significant results for CO44 (coopetition with companies from China or India), to a large extent because of the limited number of responses.

When interpreting the results from the contingency tables, we took as standard values for interpreting the values of Cramer's V, the ones proposed by Cohen (1988), which are summarised below:

df=1 (0.10 = slight effect) (0.30 = medium effect) (0.50=large effect)
df=2 (0.07 = slight effect) (0.21= medium effect) (0.35 = large effect)
df=3 (0.06 = slight effect) (0.17 = medium effect) (0.29 = large effect)
df=4 (0.05 = slight effect) (0.15= medium effect) (0.25 = large effect)
df=5 (0.05 = slight effect) (0.13 = medium effect) (0.22 = large effect)

In the case of a 2×2 contingency table, Cramer's V is equal to the Phi coefficient.

4. EMPIRICAL ANALYSIS & RESULTS

This section gives details of the most important results that, through the analysis of Cramer's V, will enable us to identify some of the relationships that are established in the German companies that cooperate, thus making it possible to create an image of the performances that characterise the firms in competition in that country. Furthermore, the significant results of all the contingency tables for all the variables are included in Appendix B. Despite the statistical significance of these relationships, the strength of the relationships in all cases (demonstrated via Cramer's V) is low or medium; thus, the strength of the relationships should not be overinterpreted.

In terms of company's size (SIZE), it can be observed that the degree of association between the variables is clearer when cooperating with EU/EFTA companies (CO42 $\chi^2=98.863$, $df=3$, Cramer's $V=0.137$, $p=0.000$) than with companies from the same country (CO41 $\chi^2=27.281$, $df=3$, Cramer's $V=0.072$, $p=0.000$) or other geographical areas. In all cases, the degree of relationship is only slight.

As it could be expected, the use of competitors as a source of information for the product or process innovation (SCOM) shows a certain relationship with the cooperation itself (CO41 $\chi^2=189.401$, $df=3$, Cramer's $V=0.193$, $p=0.000$), but the degree of association is only slight.

In this sense, it can be seen that the strongest relationships between variables occur in the case of variables associated with collaboration in innovation. This would appear to be logical because cooperation is, in itself, a collaboration mechanism. To be specific, we find particularly important results when associating cooperation with collaboration in the case of public sector clients, governments and research institutes, consultants and also universities. Relations are not so strong when we consider collaboration with private companies (private clients or suppliers).

What stands out, are the values obtained when relating the collaboration variable with US competitors (CO43) to the collaboration variables with clients outside the domestic public sector: European (CO322 $\chi^2=537.915$, $df=1$, $\phi=0.342$, Fisher's $p=0.000$), US (CO323 $\chi^2=1132.075$, $df=1$, $\phi=0.500$, Fisher's $p=0.000$), India or China (CO324 $\chi^2=1172.329$, $df=1$,

$\phi=0.515$, Fisher's $p=0.000$), and other nationalities (CO325 $\chi^2=1132.075$, $df=1$, $\phi=0.500$, Fisher's $p=0.000$). We have observed that cooperation with the US (CO43) shows stronger relationships, than those established in cooperation with the EU/EFTA (CO42) with clients in the public sector in Europe (CO322 $\chi^2=515.487$, $df=1$, $\phi=0.323$, Fisher's $p=0.000$) and on a domestic level, in Germany itself (CO321 $\chi^2=193.051$, $df=1$, $\phi=0.197$, Fisher's $p=0.000$). Be that as it may, cooperation with companies in Europe also reveals stronger relationships than cooperation with domestic companies when this is related to clients in the public sector; all this is summarised in Table 1.

**Table 1: Relationships between variables:
Cooperation with clients or customers from public sector - Cooperation with competitors**

Cooperation agreements for product and/process innovation	C041 Coopetitors: National	C042 Coopetitors: EU/EFTA/EU-CC	C043 Coopetitors: US	C045 Coopetitors: Other Countries (*)
CO321 Clients or customers from public sector: National	$\chi^2=177.486$ $df=1$ $\phi=0.187$ Fisher's $p=0.000$	$\chi^2=193.051$ $df=1$ $\phi=0.197$ Fisher's $p=0.000$	$\chi^2=112.625$ $df=1$ $\phi=0.158$ Fisher's $p=0.000$	$\chi^2=131.853$ $df=1$ $\phi=0.171$ Fisher's $p=0.000$
CO322 Clients or customers from public sector: EU/EFTA/EU-CC	$\chi^2=118.744$ $df=1$ $\phi=0.156$ Fisher's $p=0.000$	$\chi^2=515.487$ $df=1$ $\phi=0.323$ Fisher's $p=0.000$	$\chi^2=537.915$ $df=1$ $\phi=0.342$ Fisher's $p=0.000$	$\chi^2=331.973$ $df=1$ $\phi=0.275$ Fisher's $p=0.000$
CO323 Clients or customers from public sector: US	$\chi^2=141.935$ $df=1$ $\phi=0.175$ Fisher's $p=0.000$	$\chi^2=384.352$ $df=1$ $\phi=0.287$ Fisher's $p=0.000$	$\chi^2=1132.075$ $df=1$ $\phi=0.500$ Fisher's $p=0.000$	$\chi^2=934.621$ $df=1$ $\phi=0.460$ Fisher's $p=0.000$
CO324 Clients or customers from public sector: India or China	$\chi^2=121.136$ $df=1$ $\phi=0.164$ Fisher's $p=0.000$	$\chi^2=325.758$ $df=1$ $\phi=0.268$ Fisher's $p=0.000$	$\chi^2=1172.329$ $df=1$ $\phi=0.515$ Fisher's $p=0.000$	$\chi^2=1353.864$ $df=1$ $\phi=0.554$ Fisher's $p=0.000$
CO325 Clients or customers from public sector: Other countries	$\chi^2=179.499$ $df=1$ $\phi=0.195$ Fisher's $p=0.000$	$\chi^2=384.352$ $df=1$ $\phi=0.287$ Fisher's $p=0.000$	$\chi^2=1132.075$ $df=1$ $\phi=0.500$ Fisher's $p=0.000$	$\chi^2=934.621$ $df=1$ $\phi=0.460$ Fisher's $p=0.000$

(*) Also excluding China or India. **SOURCE:** Prepared by author with Eurostat / CIS 2012 data.

It can be seen that some of these relationships can be medium or even strong, and are described as such.

Another aspect worth mentioning is the values obtained regarding cooperation in EU/EFTA with clients in the private sector on a European level (CO312 $\chi^2=353.121$, $df=1$, $\phi=0.264$, Fisher's $p=0.000$) and with clients from the private sector on a domestic level (CO311

$\chi^2=216.979$, $df=1$, $\phi=0.206$, $p=0.000$), although relations are weaker than in the case of clients in the public sector, where the highest Cramer's V values are detected.

Just as significant, and with values that are well worth analysing, are the relationships between the companies that cooperate and those that collaborate with the government and research institutions. In the case of the companies that cooperate with US companies (CO43) they show medium relationships on collaborating with the Governments of the United States (CO73 $\chi^2=553.605$, $df=1$, $\phi=0.346$, Fisher's $p=0.000$), China or India (CO74 $\chi^2=434.017$, $df=1$, $\phi=0.314$, Fisher's $p=0.000$) and other countries (CO75 $\chi^2=655.506$, $df=1$, $\phi=0.385$, Fisher's $p=0.000$). When cooperating with other countries (CO45) we also detect medium relationships on relating it to collaboration with US companies (CO73 $\chi^2=341.705$, $df=1$, $\phi=0.278$, Fisher's $p=0.000$), China or India (CO74 $\chi^2=502.282$, $df=1$, $\phi=0.338$, Fisher's $p=0.000$) and the rest of the world (CO75 $\chi^2=1060.711$, $df=1$, $\phi=0.484$, Fisher's $p=0.000$). In the case of companies that cooperate in Europe (CO42), what also stands out is the relationship with European Governments (CO72 $\chi^2=1180.666$, $df=1$, $\phi=0.480$, Fisher's $p=0.000$), but no outstanding values are obtained in the case of cooperation on a domestic level with the German Government.

When it comes to collaboration with universities, this variable also reveals significant values and relationships that are worth pointing out. For example, reference must be made to the results when comparing the companies that cooperate in US (CO43) when relating it to the collaboration variable with European universities (CO62 $\chi^2=193.015$, $df=1$, $\phi=0.202$, Fisher's $p=0.000$), from US (CO63 $\chi^2=470.946$, $df=1$, $\phi=0.320$, Fisher's $p=0.000$), China or India (CO64 $\chi^2=720.965$, $df=1$, $\phi=0.395$, Fisher's $p=0.000$), and in other countries (CO65 $\chi^2=732.285$, $df=1$, $\phi=0.402$, Fisher's $p=0.000$), but this is not the case with domestic universities, that means German universities (CO61 $\chi^2=80.822$, $df=1$, $\phi=0.129$, Fisher's $p=0.000$). Furthermore, the German companies that cooperate with other countries in the world (CO45) have a medium relationship with the universities in the United States (CO63 $\chi^2=407.998$, $df=1$, $\phi=0.300$, Fisher's $p=0.000$), China or India (CO64 $\chi^2=624.598$, $df=1$, $\phi=0.371$, Fisher's $p=0.000$), and other countries in the world (CO65 $\chi^2=846.619$, $df=1$, $\phi=0.432$, Fisher's $p=0.000$). Finally, collaboration with European universities and their relationship regarding cooperation with European companies (CO42) is established (CO62 $\chi^2=1221.088$, $df=1$, $\phi=0.487$, Fisher's $p=0.000$). In this case, the companies that cooperate on a domestic level (CO41) are more likely to collaborate with domestic universities (CO61 $\chi^2=510.931$, $df=1$, $\phi=0.313$, $p=0.000$), but the Cramer's V value is slighter.

Once again we have observed that the values of Cramer's V are always lower in cooperation on a domestic level: this leads us to think that German companies would rather cooperate abroad to prevent direct competition with their nearby companies, and that they prefer international environments where they collaborate with suitable partners. These cooperative processes seem to take place especially with clients in the public sector or government and universities. That is to say, it would appear to be the case that the cooperative activities are usually associated with contracts or collaborations with public environments seeking an international positioning beyond competition with the domestic market.

In terms of collaboration with other partners, one thing that stands out is the cooperation relationship in the USA (CO43) with the consultants in the USA (CO53 $\chi^2=1306.739$, $df=1$, $\phi=0.532$, Fisher's $p=0.000$) and the relationship with the consultants on a European level (CO52 $\chi^2=409.393$, $df=1$, $\phi=0.298$, Fisher's $p=0.000$). As far as the suppliers are concerned, cooperation preferably takes the form of collaboration with suppliers on a European level CO42 (CO22 $\chi^2=466.712$, $df=1$, $\phi=0.303$, Fisher's $p=0.000$), rather than in Germany itself.

Finally, we believe that it is of interest to highlight the cooperation relationship on a domestic level (CO41) with the percentage of employees that have university degrees (EMPUD $\chi^2=120.939$, $df=6$, Cramer's $V=0.157$, $p=0.000$) and with the sector (NACE $\chi^2=197.243$, $df=46$, Cramer's $V=0.194$, Fisher's $p=0.000$) to which the innovative enterprise belongs.

5. CONCLUSIONS

In the spirit of a renaissance in strategic planning research in the 21st-century, era of globalization and digitalization, cooperation emerges as a key research topic. Our study contributes to the knowledge that relates cooperation and innovation, in line with the above-mentioned areas, as suggested by Bouncken et al. (2015), in order to increase research into cooperation. Therefore, with our analysis, we have made a positive addition to the literature by adopting a quantitative approach and incorporating new variables into the study.

On analysing competition in Germany, it has been observed that collaboration with competitors on a European level demonstrates stronger relationships with the rest of the variables, than cooperation on a domestic level, in other words in Germany. In general, it would seem that this type of interaction is what is preferred on an international level, maybe because for the domestic market it is possible to give precedence to competition rather than the potential benefits of collaborating with rivals with a view to innovating.

The relevance of the partner selection (firm, university or research institute) in the balance of co-operative and competitive forces in the organisation is one of the key findings described by Cassiman, Di Guardo & Valentini (2009), in their case for R&D projects. In our case, for innovation, it would appear that the partners in collaboration/cooperation also play an essential role, as does their location. It has been observed that the relationships are particularly strong when collaborating with competitors from the US, in the collaboration with international public sector clients, with the international governments and research institutions, and with international universities. Mention must also be made of the relationship that German companies collaborating with competitors in Europe have with public sector clients, government, research institutions and universities in Europe, this effect being less evident in the domestic environment. Information has likewise been offered about private clients and suppliers, but there is only a slight association with the variables. The relationship with the sector to which the company belongs and with the percentage of employees at the innovative company who have university degrees has also been observed (see Appendix B). In that sense, a higher number of employees with degrees could lead to or facilitate the organising of more sophisticated and complex collaboration mechanisms for innovation, such as cooperation.

On establishing these relationships, we could construct a certain image of the kind of enterprise that cooperates and innovates in Germany. However, as we have already pointed out, in spite of the statistical significance of the identified relationships (demonstrated via Cramer's V), too much should not be read into the strength of these relationships. Yet this does provide us with certain insight, based upon statistical analysis, which sheds some light on the cooperative process, how it occurs and with whom it takes place, in accordance with the aim of this research work.

This study has its limitations, which are mainly attributable to the shortcomings of the available data. As a result, we have been unable to tackle a more ambitious European approach, limiting our research to the German case in order to guarantee the quality of the data used for carrying out the analysis. What is more, the dichotomic nature of many variables has made us opt for a simple yet sound analysis of the assessment of the relationships without further statistical complexity. It is our aim to go more deeply into the interpretation of the data in order to be able to reach more substantial conclusions. The data available are from 2012, which is in itself a limitation, because more recent data were not yet available that could give a more accurate and updated view. However, the genuine observations announced here provide fresh inputs regarding the cooperative reality of innovative companies that we believe to be useful.

The search for methodological ideas that will enable us to make better use of the available data and broader approaches on a pan-European level are being considered as future lines of research. Thought is also being given to utilising, analysing and interpreting more recent information with the microdata from the next phases of the survey that will enable us to relate cooperation and innovation. The findings in themselves open up new channels of research, because they introduce the international element as a variable for future study. It is also of interest to carry on developing the insights expressed here and to understand the mechanisms that make a difference when it comes to whom one is competing against, and to continue to go more deeply into the potential differences in the roles played by governments, public sector clients or universities in this context. The institutional nature of these partners makes studying them a particularly invigorating subject: it is not in vain that cooperation has been demonstrated to have strong implications not only in terms of corporate strategy but also in public policies, as Jorde and Teece (1989) pointed out. Along the same lines, it is advisable to keep on researching into the right choice of governance mechanisms that will allow for better coordination of activities and resource contributions from all these allying partners (Hoetker & Mellewigt, 2009).

Whatever the case may be, and in view of the fact that examining the *how* question as to the stream of cooperation dynamics is the most challenging theme (Peng, Yen & Bourne, 2017), the article contributes to adding to the literature on a subject that is so important to academics and practitioners. Finding new channels for collaborating with competitors in a variety of spatial and time scenarios is undoubtedly an invigorating way of tackling innovation.

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