

THE INTELLECTUAL STRUCTURE OF COOPETITION:

PAST, PRESENT, AND FUTURE

Abstract

Purpose: This paper investigates the intellectual structure of coopetition by utilizing citation and co-citation analyses of scholarly articles focusing on coopetition.

Design/methodology/approach: The researchers conducted bibliometric analyses of citation and co-citation analysis. The units of analysis were original research articles and research notes retrieved from journals indexed by well-known databases. The researchers placed no restrictions on the publication time period.

Findings: The research findings provide evidence that coopetition demonstrates multidisciplinary and interdisciplinary characteristics. Subfields of the coopetition field were identified based on the components of coopetition: relation, process, and strategy. The component dealing with relationship management and innovation as a strategy are notably prominent. Although coopetition literature has emerged as a relation view of strategy, it is still fragmented and diverse. Additionally, the robust subfields generated from the analysis were super-positioned with low degrees.

Originality/value: This is one of the few studies offering a critical review of coopetition research via the quantitative research approach.

Keywords: Coopetition, strategy, bibliometrics analysis, citation, co-citation, intellectual structure.

Introduction

Previous studies have investigated the foundations and fundamentals of coopetition, how to manage cooperative relationships, the benefits and risks of coopetition, the role of coopetition in business performance, and explanations about how value is created in interfirm alliances (cooperative relationships) (see Bagshaw & Bagshaw, 2001; Bengtsson, Eriksson, &

Wincent, 2010; Bengtsson & Johansson, 2014; Bengtsson & Kock, 2000; Bonel, Pellizzari, & Rocco, 2008; Chen & Hao, 2013; Chin, Chan, & Lam, 2008; Devece, Ribeiro-Soriano, & Palacios-Marques, 2017; Gnyawali & Madhavan, 2001; Lechner & Dowling, 2003; Lechner, Dowling, & Welppe, 2006; Osarenkhoe, 2010; Luo, Rindfleisch, & Tse, 2007; Rai, 2013; Ritala, Hallikas, & Sissonen, 2008; Tsai, 2002; Walley, 2007). In particular, several studies have discussed issues related to the knowledge domain of coopetition research (see Bengtsson & Kock, 2014; Bengtsson & Raza-Ullah, 2016; Bengtsson *et al.*, 2016; Bouncken, Gast, Kraus, & Bogers, 2015; Czakon, Mucha-Kuś, & Rogalski, 2014; Dorn, Schweiger, & Albers, 2016; Gast, Filser, Gundolf, & Kraus, 2015; Mina, 2011; Mina & Dagnino, 2016; Peng, Pike, Yang, & Roos, 2012; Walley, 2007).

Mina and Dagnino (2016) conducted a survey and systematic review to investigate consensus on the meaning of coopetition within the scholarly community of strategic management and the relevant literature, respectively. According to them, although coopetition is recognized as a relevant research area in strategic management, there was no consensus on its definition. They explained how coopetition has turned into a relevant area of strategic management by theorizing about multifaceted strategic relationships. However, these studies have not fully examined the evolution of the knowledge domain or the intellectual structure of the coopetition literature via co-citation analysis (Bengtsson *et al.*, 2016; Bengtsson & Kock, 2014; Bengtsson & Raza-Ullah, 2016; Bengtsson *et al.*, 2016; Bouncken *et al.*, 2015; Czakon *et al.*, 2014; Dorn *et al.*, 2016; Gast, *et al.*, 2015; Mina, 2011, Mina & Dagnino, 2016; Peng *et al.*, 2012; Walley, 2007). As an extension of these previous studies, specifically Mina (2011) and Mina & Dagnino (2016), the present research seeks to:

- Explore the evolution of the intellectual structure of the coopetition literature;

- Delineate changes in the intellectual structure of research on coopetition via the citation and co-citation analysis of coopetition-related articles published in the academic literature;
- Clarify the subfields of the intellectual structure of coopetition accepted as a field based on Mina & Dagnino (2016), and the relationships, if any, between these subfields; and
- Determine which strategic management approaches have been the most influential for coopetition studies.

This paper discusses the evolution of the meanings of coopetition and provides an overview of the studies evaluating the evolution of coopetition. Following this, the paper explains the bibliometric methods and citation and co-citation analyses employed in this study. Next, the paper presents and discusses the research findings. The paper concludes by offering conclusions and suggestions for future research.

Literature Review

What is Coopetition?

Most management literature focuses on how companies gain (sustainable) competitive advantages (Barney, 1991; Dyer & Singh, 1998; Grant, 1991; Lalicic, 2018; Peteraf, 1993; Porter, 1985). However, scholars have rarely discussed what competitors should do to survive in a limited market concerning game theory, which offers strategies from winning to losing (Bengtsson & Kock, 2000; Brandenburger & Nalebuff, 1996; Gnyawali & Madhavan, 2001). In line with the continuous changes that occur in business environments, opportunities, and conditions, competitors have moved to adopt a vision beyond the simple understanding of cooperation and competition—associated with game theory—to gain competitive advantages (Brandenburger & Nalebuff, 1996). Consequently, the coopetition approach was generated as

a mindset that combines competition and cooperation in the marketplace (Brandenburger & Nalebuff, 1996; Wang & Krakover, 2008).

Coopetition occurs when competitors engage in cooperative relationships. In this kind of strategy, competitors form alliances to combine resources, work together, and transfer or share knowledge to create better business environments, increase performance or market shares, and gain sustainable competitive advantages (Adongo & Kim, 2018; Bengtsson & Kock, 2000; Gnyawali & Madhavan, 2001; Tsai, 2002; Lupke, 2009). Coopetitive relationships among competitors can provide firms with advantages, such as alternative resources, capabilities, opportunities, and knowledge, although it is also possible for a company engaging in coopetitive relationships to encounter threats and risks (Gnyawali, He, & Madhavan, 2006; Gnyawali & Song, 2016; Bonel & Rocco, 2007; Ritala, Hallikas, & Sissonen, 2008).

Competitors may use coopetitive strategies to gain market power and innovations, create better relationships in their supply chain, and achieve global competitiveness (Bouncken *et al.*, 2015; Gnyawali & Park, 2009). Consequently, coopetition emphasizes that companies should pursue both competition and cooperation strategies simultaneously with their competitors (Brandenburger & Nalebuff, 1996; Peng *et al.*, 2012; Ritala, Golnam, & Wegmann, 2014). This structure of the concept provides perspectives to explain the behaviors of competitors, as seen in Table 1.

The definitions provided in Table 1 clarify the simultaneous application of competition and cooperation and illuminate the mutual benefits that may be obtained by competitors at the different levels of business or competition. As seen in the evolution of these definitions as a research field, coopetition has three components. The first is relationship management with competitors, focusing on how such relationships should be built, developed, managed, and terminated. The second is coopetition as strategy, addressing how a firm can use their relationships with competitors to gain (sustainable) competitive advantage or to create value.

The final component is coopetition as a process, concentrating on how coopetition practices involve integrated organizational culture and policies to formulate and implement strategies throughout an entire relationship with competitors. In this study, coopetition is accepted as “a strategic and dynamic process in which economic actors jointly create value through cooperative interaction, while they simultaneously compete to capture part of that value” (Bouncken *et al.*, 2015, p. 591).

Insert Table 1 about here

In this context, the fundamentals of coopetition as a research field may be explained as a complement or an extension of strategic management approaches. First, to win the game, companies must use the position approach, the resource-based view, or both. Coopetition can be a moderating or mediating strategy for winning the game by collaborating with rivals. Second, since coopetition is related to managing relations with competitors, there are reciprocal benefits between coopetition strategy and behavioral strategy, focusing on the integration of cognitive and social psychology, and social interaction with strategic management theories (Powell *et al.*, 2011). Finally, coopetition research contributes to strategy-as-practice as research dealing with “the doing of strategy; who does it, what they do, how they do it, what they use, and what implications this has for shaping strategy” (Jarzabkowski & Spee, 2009).

Evolution of Coopetition Literature

Several studies have assessed and reviewed scholarly articles focusing on the concept of coopetition. These studies conducted systematic literature reviews to identify the evolution of the concept and to provide agendas for future research (see Bengtsson & Kock, 2014; Bengtsson & Raza-Ullah, 2016; Bengtsson *et al.*, 2016; Bouncken *et al.*, 2015; Czakon *et al.*, 2014; Dorn *et al.*, 2016; Mina, 2011; Mina & Dagnino, 2016; Peng *et al.*, 2012; Walley, 2007).

Czakon *et al.* (2014) identified the features of coopetition by conducting frequency analysis with a focus on the definitions of coopetition adopted in the articles. As a result, these authors identified six distinctive features attributed to coopetition, namely: (a) simultaneous cooperation and competition and (b) the mutual benefits stemming from coopetition. Meanwhile, the topics of (c) complexity, (d) dynamics, (e) managerial challenges, and (f) industry reshaping were also discussed as additional features. Finally, these authors identified the theoretical frameworks used by researchers to study coopetition and revealed that the three prevailing perspectives were alliance formation, competition, and network theory.

Bouncken *et al.* (2015) concluded that there are three major streams of coopetition research: 1) the scope and development of research on coopetition, 2) the analysis of coopetition as a strategy, and 3) the management of coopetition. Bengtsson and Kock's (2014) study identified five research streams concerning the motives, likelihood, interactions, processes, and outcomes of coopetition. Gast *et al.* (2015) described three clusters based on topical congruence, from which the coopetition research was further detailed. The first topical cluster was named *foundations*, describing antecedent theories of coopetition; the second was named *nature of coopetition*, exploring the nature of the concept; and the last was the *scope of coopetition*, providing insights into the application of coopetition in different business contexts.

Although these studies primarily concentrated on coopetition research, they did not identify the evolution of the intellectual structure of coopetition research to extend the discussions on academic fundamentals of coopetition literature. In other words, they did not address the following questions: Which articles and journals had the most impact on a research stream? How did the impacts of the articles change over the given period? What is the intellectual structure of coopetition literature? How has the structure of coopetition literature developed over time? Therefore, as a complement or an extension of these studies, specifically Mina (2011) and Mina & Dagnino (2016), the main purpose of the current study is to explore

the evolution of the intellectual structure of the coopetition literature by discussing an existing relevant debate revolving around the conceptualization(s) of coopetition.

Methodology

The study involved conducting bibliometric analyses of citation and co-citation analysis. The units of analysis in this study were original research articles and research notes, consistent with samples used in earlier studies (Annareli & Nonino, 2016; Nerur, Rasheed, & Natarajan, 2008; Ramos-Rodrigues & Ruiz-Navarro, 2004). Bibliometric methods (citation and co-citation analysis) were utilized to address the research questions. Citation analysis is a statistical tool for highlighting influential documents, authors, and journals in a particular field by counting references within the bibliographies of documents in a given time period (Baker, 1990; Kolata, 1991; Koseoglu, Sehitoglu, & Craft, 2015; Zupic & Čater, 2015).

Co-citation analysis is an extension of citation analysis that investigates the relationships among the references provided in the articles (Ramos-Rodrigues & Ruiz-Navarro, 2004; Nerur, Rasheed, & Natarajan, 2008; Pilkington & Lawton, 2014; Nerur, Rasheed, & Pandey, 2015). It is based on the concept that pairs of documents that often appear together in reference lists (i.e., are co-cited) are likely to have something in common. In other words, when two authors or papers are frequently cited together, it is likely that their ideas or arguments are related to each other. A list of all possible pairs of works cited among all citations in a given document enables a researcher to obtain the basic data for co-citation frequencies and co-citation networks (Benckendorff & Zehrer, 2013, p. 127). The results can assist researchers and readers in identifying and clarifying the intellectual structure of disciplines over time, and can also identify the most influential research, or the central, peripheral, or bridging studies of the field (Acedo & Casillas, 2005; Acedo, Barroso, & Galan, 2006; Zupic & Čater, 2015). The references of a scientific paper represent the theoretical and empirical foundations of the study. Similarly, analyzing the references of a publication enables the identification of the studies

belonging to the same school, paradigm, or theory (Acedo, Barroso, & Galan, 2006). This method has been applied in several disciplines (see Casillas and Acedo, 2007; Kim & McMillan, 2008; Neff & Corley, 2009; Pilkington & Meredith, 2009). The validity, power, and usefulness of this analysis method have been proven in a variety of studies (Ramos-Rodriguez & Ruiz-Navarro, 2004; Zupic, & Čater, 2015).

To achieve the goals of this research, factor analysis and multidimensional scaling were utilized. Factor analysis is a statistical technique that helps researchers reduce the amount of data. Factor analysis also allows researchers to identify potential subfields of a discipline via the factors generated from factor analysis using citation or co-citation matrices (Annarelli & Nonino, 2016; Koseoglu *et al.*, 2015). Factors generated from the analysis comprise relatively homogenous groupings of cited articles that may represent a subfield (Di Stefano *et al.*, 2010). Multidimensional scaling (MDS) is a data reduction method that enables researchers to draw maps from the correlation matrix of items (Ramos-Rodriguez & Ruiz-Navarro, 2004), graphically representing the conceptual similarities and proximities between the objects of interest (Annarelli & Nonino, 2016). MDS provides a bi-dimensional map in which “the position of each article depends on its relationships with the other papers” (Annarelli & Nonino, 2016). As stressed by Di Stefano *et al.* (2012, p. 1288), MDS is used as a robustness check of factor analysis, providing a better understanding of the relationships between the different factors or papers.

Document Type and Database Selection

In the present study, researchers adopted several steps to specify and delimit the scope of the assessment to ensure the validity and reliability of the work. Accordingly, following previous studies (Nerur, Rasheed, & Natarajan, 2008; Ramos-Rodrigues & Ruiz-Navarro, 2004) the researchers first focused on determining the databases that would be searched for the sample articles. The researchers formed the sample from articles published in peer-reviewed

journals that generate a certified type of knowledge (Ramos-Rodrigues & Ruiz-Navarro, 2004), rather than from books and congress proceedings. These articles were retrieved from journals indexed by well-known databases, as no peer-reviewed journals have focused directly on coopetition research. Online databases, namely, Scencedirect, EBSCOhost, ProQuest, Wiley, Emerald, Sage, Elsevier, Taylor and Francis, and JSTOR were selected because of the the reputation and significance these databases have in the academic world (Bounckenet *et al.*, 2015; Ordanini *et al.*, 2008).

Data Collection

Following the first phase, research articles or research notes published in English were obtained from the selected databases by scanning for keywords extracted from the literature and, in particular, the keywords used in three articles focusing on the evolution of coopetition research (see Mina, 2011; Bouncken *et al.*, 2015; Czakon, Mucha-Kuś, & Rogalski, 2014). Keywords used in the search were “coopet, co-opet, coopetition, co-opetition, simultaneous cooperation and competition, simultaneously cooperate and compete, coexistence of cooperation and competition, co-existence of cooperation and competition, cooperate and compete simultaneously, coopetitive relationships, co-opetitive relationships, coopetitive networks, horizontal alliances, cooperate with competitors, cooperation with competitors, cooperative relationships with competitors, cooperative competition, and competitive cooperation.” No restrictions were placed on the publication time period of the sample articles, and the search covered all publication periods up to and including December 2015.

The researchers then reviewed the articles pulled from the databases to determine whether they were directly related to coopetition. At this stage, the researchers checked the titles, keywords, and abstracts of all sampled articles to ensure their relevance. Each researcher answered several questions about each article: Is the article in English? Is the article an original research paper or research note? Does the article directly or indirectly relate to coopetition? To

ensure data validity and reliability, a consensus was reached on the selected articles. The resulting sample contained 413 articles. In the next stage, the researchers scrutinized the content of each article and retained the 296 articles with the greatest relevance to the topic. Finally, the researchers once again evaluated the relevance of the retained articles from the earlier stages of consensus. Based on the output of this last step, the researchers agreed on a final sample of 222 articles for subsequent analysis. To select these articles two researchers coded all articles by addressing whether the articles are related to competition and/or selected keyword. When two researchers agreed that the articles are related to competition, these articles were included in the sample. When the conflicts between these two researchers were occurred another author of the study helps them to reach 100% inter-coder reliability rate. Hence, by reaching 100% consensus for the articles making conflicts between two researchers inter-coder reliability was strength to increase validity and reliability of the study. To utilize citation and co-citation analyses, the citations of each article, including cited articles and their corresponding journals and authors, were manually inserted into a spreadsheet (Excel) to eliminate or minimize possible spelling errors in the databases. Additionally, the publication year and journal of each article were confirmed and cataloged.

Analysis

Three steps were followed to sort the articles and their citations. The first step outlined the citation frequencies of the articles according to years and journals. Next, citation analysis was utilized to highlight important publications, publication types, and the journals with the greatest impact on competition literature. Finally, co-citation analysis was used to sharpen and map dominant paradigms from the sample, which included articles published between 1997 and 2015. This procedure was consistent with previous studies (Annareli & Nonino, 2016; Nerur, Rasheed, & Natarajan, 2008; Ramos-Rodrigues & Ruiz-Navarro, 2004). The period was divided into two subperiods (2010 and before, 2011–2015), to illustrate significant changes

and trends in the literature. There are two main reasons the year 2010 was chosen as the division point. First, Figure 1 shows that the number of articles related to coopetition has increased after the year 2010, as predicted by Bouncken *et al.* (2015) and Czakon *et al.* (2014). To illustrate this trend, an exponential trendline was assessed using different regression models (the linear, logarithmic, and power law approaches) with dependent (published articles) and independent (the articles' publication year) variables to identify the model that best fits the data (Barrios *et al.*, 2008). The proportion of explained variance was greater in the exponential model ($R^2 = 0.8912$) than the power law ($R^2 = 0.7981$), linear ($R^2 = 0.7813$), and logarithmic ($R^2 = 0.5226$) models, although all four models were significant. Second, two influential books (Dagnino & Rocco, 2009; Yami *et al.*, 2010) on competition were published in 2009 and 2010. Consequently, 2010 may be accepted as a fraction for coopetition literature (Mina & Dagnino, 2016).

Insert Figure1 about here

Results and Discussion

Frequency of Articles by Years and Journals

Figure 1 presents the frequency of the 222 articles by year, according to the selected articles published on coopetition between 1997 and 2015. The number of articles doubled over the course of the period. The number of articles increased remarkably from two in 2005 to 33 in 2015. The highest number of articles was 44, published in 2014. In comparison, Mina (2011) found 82 studies, including 53 papers in the journals of the Institute for Scientific Information and 29 articles published in three edited academic books, published from January 1996 to December 2010. Czakon *et al.* (2014) considered 82 articles for a systematic literature review, from 523 articles published between 1997 and 2010. Meanwhile, Bouncken *et al.* (2015)

selected 82 articles from 139 articles published between 1996 and 2013 to conduct a systematic literature review of coopetition. The discrepancies in the number of reviewed articles in the current and prior studies are due to the databases that were scanned, the periods considered, and the criteria employed to select articles.

Table 2 demonstrates the frequency of articles by journal. *Industrial Marketing Management* had the highest percentage (15 articles; 6.76%), followed by *International Studies of Management & Organization* (six articles; 2.70%), *Technovation* (6 articles; 2.70%), *British Journal of Management* (five articles; 2.25%), *Journal of Operations Management* (four articles; 1.80%), *Journal of World Business* (four articles; 1.80%), and *Technology Analysis & Strategic Management* (four articles; 1.80%). Each of the remaining journals, namely *European Management Journal*, *International Journal of Logistics Research and Applications*, *Management Research: Journal of the Iberoamerican Academy of Management*, *Procedia - Social and Behavioral Sciences*, *Sustainability Accounting, Management and Policy Journal*, *Technological Forecasting & Social Change*, and *Telematics and Informatics*, each published three of the selected articles (1.35%) pertaining to coopetition.

The remaining articles (157; 70%) were published in 133 (90.5%) different journals. Twenty-four of these journals published two articles, while the rest (109) released only one article each. This picture illustrates how the literature of coopetition is scattered, although a few journals did have special issues focusing on coopetition (Bouncken *et al.*, 2015). There has also been a remarkable increase in the number of published articles on this subject in recent years. However, many leading business and management journals have not shown a significant amount of interest in the concept. This may represent a significant barrier to conducting comprehensive studies on coopetition.

Insert Table 2 about here

Citation Analysis

Table 3 lists 50 highly cited journals from the articles related to coopetition published between 1997 and 2015. The highest percentage of cited articles corresponded with *Strategic Management Journal* (7.74%), followed by *Academy of Management Review* (5.01%), *Industrial Marketing Management* (3.05%), *Academy of Management Journal* (3.03%), and *Organization Science* (2.83%). This table reflects how coopetition has been examined within different disciplines, such as business, management, marketing, entrepreneurship, sociology, and psychology.

Insert Table 3 about here

Table 4 presents coopetition articles cited at least ten times. These were selected to illustrate the evolution of coopetition research since they include “certified knowledge” (Ramos-Rodrigues & Ruiz-Navarro, 2004) and focus on specific research questions rather than the broad topics of books. A few indicators obtained from the table are related to the growth of the coopetition literature. First, many of the cited articles (see Bengtsson & Kock, 1999, 2000; Gnyawali & Madhavan, 2001; Tsai, 2002) focused on network theory, strategic alliances, or the relation view of strategy. These had the highest impact on coopetition research. This indicates that coopetition literature primarily engages in the relational view of coopetition at the micro or macro level. Second, several cited articles (see Ahuja, 2000; Cohen & Levinthal, 1990; Gnyawali & Park, 2011; Ritala, 2012; Tether, 2002) illustrate how coopetition influences innovation or learning as a process part of coopetition. Third, a few cited articles (see Mariani, 2007; Morris, Kocak, & Ozer, 2007; Osarenkhoe, 2010) emphasize coopetition as a strategy. In this respect, coopetition research focuses on the relation view of coopetition more than the

process or strategy views of cooperation. Fourth, since cited articles related to the resource-based view or learning process had a significant impact on cooperation literature, mainstream approaches resource-based view (see Das & Teng, 2000; Prahalad & Hamel, 1990; Wernerfelt, 1984) or emergent (learning) strategies (see Dussauge, Garrette, & Mitchell, 2000; Lane & Lubatkin, 1998) in the strategic management field have been the most influential views for cooperation studies. Finally, the cited articles discuss how theories built from case study research (Eisenhardt, 1989) had a significant impact on cooperation literature. This may indicate that researchers primarily considered the process inductive theory to build or test theories or hypotheses related to the nature of cooperation.

Many of the case study articles involved conceptual studies, although a few were empirical, observing samples from technology companies or industries. This is indicative of how the cooperation literature has evolved scientifically. For the most part, cooperation has been viewed through the lens of the resource-based theory and explained via the network theory, game theory, and cooperation approaches. Furthermore, progress on the concept has primarily been accrued by the findings of conceptual studies rather than empirical ones.

Changes in the Impact of Cited Articles Between 1997–2010 and 2011–2015

Table 4 presents the percentage of articles cited in each study based on a specific period, while Figure 2 outlines the changes between the two periods. In the second period (2011–2015), the impact of the cited articles focusing on innovation (A11, A12, A13, A17, A18, and A27) and networks (A1 and A5), increased significantly. Specifically, while the impact of the cited articles on cooperation literature (A2, A21, A28, A39, A51, and A60) related to macro level networks (society level, strategic alliances) decreased, the impact of the cited articles (A1, A3, A5, A14, A15, A43, A46, and A47) related to networks on the micro level (firm-based) increased. The impact of one article (A10) drastically decreased. Many factors may have influenced this case. A primary reason for the decrease may be that the article (Hamel *et al.*,

1989, p. 139) focuses on collaboration as a low-cost strategy for building new process capabilities and winning battles over new products and technologies. Currently, coopetition literature emphasizes several articles in strategic management literature rather than those focusing on innovation or the relation view of strategy.

The impact of the cited articles related to the nature, typology, and fundamentals of coopetition (A4, A7, A9, A22, A38, and A59) also increased in the second period. The dominance of the resource-based view (A36, and A55) in coopetition literature has dwindled. This analysis indicates that coopetition literature is primarily fed from the network theory, alliances perspectives, competition dimensions (approaches), and relationship management, as indicated in Czakon *et al.* (2014). This supports the clusters of coopetition literature generated by Mina (2011), including the relational dimension of the coopetition construct, the strategic dimension of coopetition, the contextual factors leading to the emergence of cooperative phenomena, and attempts to define and model coopetition.

Insert Table 4 & Figure 2 about here

Factor Analysis

After identifying the 63 articles cited most frequently, the researchers followed the steps discussed in Leydesdorff and Vaughan's (2006) study. First, a citation matrix for each period was retrieved from the dataset generated from the reference lists of the articles related to coopetition published between 1997 and 2015. A second matrix of 63 cited articles, including the coefficients of Pearson's correlations, was generated from the citation matrix. Factor analysis was employed for each subperiod and the overall period. As conducted in previous studies (Annareli & Nonino, 2016; Koseoglu *et al.*, 2015; Nerur *et al.*, 2008) principal components with varimax rotation were run to extract the key factors. When factors are

extracted, three criteria were considered: articles with a minimum eigenvalue of 1 (Annareli & Nonino, 2016), cited articles with loadings above ± 0.4 (Di Stefano *et al.*, 2012; Pilkington & Meredith, 2009), and a minimum of three cited articles per factor (Young & Pearce, 2013). All the factors were included in the interpretation (Di Stefano *et al.*, 2012), although several factors had negative loadings, signaling a “reverse co-citation profile with respect to the other papers in the group. This means that it is unlikely to be cited along with other papers in this group, and as such is not really a part of this group” (Di Stefano *et al.*, 2010, p. 1196).

Tables 5–7 summarize the factors for each period. As shown in Table 5, factor analysis of the first period (1997–2010) produced 11 factors with 87.57% explained variance. When considering the three criteria, the first five factors resulted in 65.10% explained variance, and several articles, such as A10, A21, A51, and A52, were excluded. Factor 1 was labeled “coopetition as process, strategy, and relationship,” influenced by the game theory, network theory, alliances, learning theory, and resource-based view, and stressing innovation opportunities or financial performance. Factor 2 is “the relationship and nature of coopetition,” as it addresses arguments on coopetition in business networks, the nature of coopetition, relational capital, collaboration networks, strategic alliances, and the fundamentals of coopetition. Factor 3 is labeled “management capabilities for coopetition,” and focuses more on micro issues like coopetition capabilities for technology change, the impact of coopetition on competitive behavior, the ideal balance between competition and cooperation, and multifaceted relationships concerning coopetition. Factor 4 portrays the emergence of how companies use coopetition to gain competitive advantages by focusing on coopetition driven strategy, the rise of coopetition, and game structure. Consequently, it is called “coopetition to survive.” Finally, Factor 5 is called “case studies for coopetition,” as it emphasizes theory building via the use of case studies in coopetition research.

Insert Table 5 about here

Based on the three criteria used for factor analysis in this study, Table 6 outlines the first seven factors from an analysis of the second period (2011–2015) with 61.74% explained variance, although sixteen factors, with 85.00% explained variance, were generated. Four cited articles—A8, A18, A51, and A62—were eliminated, as no factors were assigned to them. Factor 1 deals primarily with the strategic allegiances theory, so it was labeled “coopetition as strategic alliances.” Factor 2 was named “coopetition as relationship,” and was dominated by relationships, the strength of weak ties, and interactions. Since Factor 3 is related to competitive behavior, it was labeled “behavioral coopetition.” Factor 4 was built on social structures and the embeddedness paradox, and is called the “social structure of coopetition.” Factor 5 is called “coopetition as strategy” since it addresses arguments considering how and when practices of coopetition are successful. Factor 6 deals with the intended and unintended results of coopetition by focusing on theory building from case studies. This factor indicates how coopetition works as a process in both small and medium enterprises, and in inter-organizational units. Consequently, it is called “coopetition as process.” Finally, Factor 7 is called “organizational performance and coopetition,” as it deals with how coopetition strategies affect organizational performance. The number of significant factors increased from five to seven in the second period, reflecting the growth of the field, as well as the development of subfields. In the second period, the borders of the subfields of coopetition literature were not dense. However, the coopetition literature was not fragmented or compartmentalized, and it showed more of an eclectic orientation.

Insert Table 6 about here

When factor analysis was run for overall period (1997–2015), sixteen factors emerged, with 82.184% explained variance. Following the three previously mentioned criteria, six factors with 56.04% explained variance (see Table 7) were extracted. Articles A58, A59, A60, A61, and A62 were not allocated any factors and were removed from the sample. When the second and overall period factors were compared, no significant differences among the cited articles were noted. However, there are significant differences in the factor loadings of the cited articles in the assigned factors. For example, Factor 1 was dominated by cited articles focusing on relationship management in cooperation; thus, is named “relationship management.” The cited articles in Factor 2 addressed the relationship between innovation and cooperation and is called “innovation with cooperation.” Factor 3 is “economic and social behavior in cooperation,” as it raised issues related to competitor capabilities, embeddedness, and economic or social behavioral patterns. Factor 4 is labeled “competitive dynamics of cooperation,” as it addresses the balance between competition and collaboration by focusing on competition behaviors. In Factor 5, the rise of cooperation, social networks, and alliances are based on the cooperative approach. Thus, this factor is called “cooperative dynamics of cooperation.” Factor 6 is called “nature of cooperation,” as the cited articles primarily focus on the methodology employed to build theories, the coverage of cooperation, and the resource-based view of the firm.

Walley (2007) highlighted eight themes, including the typologies and models of cooperation; cooperation and firm performance; cooperation within an economy; the resources, capabilities, and competencies underpinning cooperation; applying competitive strategy; managerial perceptions of cooperation; internal cooperation; and cooperation in relation to consumers as a focus for future studies in cooperation. By using a bibliographic coupling approach, Mina (2011) identified several subfields of cooperation, including the relational

dimension of the coopetition construct; the strategic dimension of coopetition; the contextual factors leading to the emergence of coopetitive phenomena; and attempts to model and define coopetition. Gast *et al.* (2015) conducted citation analysis of coopetition studies and identified three subfields: foundations (traditional theories and predecessor theories), nature of coopetition, and the scope of coopetition (at the intraorganizational level, in an international context, and in terms of innovation).

In comparing these findings with the results of the present study, several of subfields share similarities with the subfields presented by Mina (2011), Walley (2007), and Gast *et al.* (2015). The findings of the present research, however, offer more in-depth analysis. Additionally, this study's findings highlight the evolution of coopetition research from a general view of competition as process, strategy, and relationship to a specific view of relationship management in a competitive environment. Similar to Mina and Dagnino's (2016) findings, the present study indicates that coopetition emerges as a research area engaging in theorizing and exploring multifaceted strategic relationships between actors.

Insert Table 7 about here

Multidimensional Scaling

Before conducting multidimensional scaling (MDS) analysis, a dataset for each period was prepared in two steps. First, the cited articles not assigned factors were removed from the dataset. Second, Pearson's correlation coefficients were generated. As seen in Figures 3–5, MDS was run for each period. The Kruskal's stress test result for each period, coupled with the R-squared (RSQ) value, provides an acceptable level of goodness of fit for the co-citation data (Di Guardo & Harrigan, 2012; Di Stefano *et al.*, 2012, 2010; McCain, 1990): First Period (1997–2010) - Stress = .20648, RSQ = .78675; Second Period (2011–2015) - Stress = .23523;

RSQ = .70731; Overall Period (1997–2015) – Stress = .18812, RSQ = .80449. Two criteria are required to interpret the map. First, the cited articles near the center of the map imply that coopetition literature has a relationship with schools of thought showing heterogeneous citation profiles (Di Guardo & Harrigan, 2012). Second, “the greater the proximity between papers within a group, the higher the internal consistency of the set of documents” (Di Stefano *et al.*, 2010).

Comparing and individually evaluating each period yields several interesting observations. First, more articles in the second period tend to be positioned closer to the center and closer to one another. There are strong ties among the majority of the papers within Factor 1 and Factor 2 in each period. However, the ties among the papers are not strong in the first and overall periods. This indicates that coopetition literature has developed enough for distinct topical streams to have emerged. Second, while in the first period, A2 (related to rent-seeking strategic behaviors) is closer to the center, in the second period A7, A19, and A37 (related to the introduction of the coopetition concept as relationship between competitors, a case study method for building theory, and coopetition as a business strategy, respectively) are closer to the center. This may reflect that heterogeneity has been emerging in coopetition literature. In the overall period, A2, A6, and A14 (related to rent-seeking strategic behaviors, networks and structural embeddedness, and competitive behavior). This can be interpreted as an indication that coopetition engages in relation management among competitors. A relation-based view of strategy that addresses how relationships among competitors should be strategized to gain sustainable competitive advantages, focuses on the content of the strategy, and determines how that strategy should be formulated and implemented may emerge as a new research area (Mina & Dagnino, 2016).

Finally, Factor 1 and Factor 2 dominated each period. Different cited articles and loading scores were visually split into two subgroups of articles. For example, while in Factor

1, called “coopetition as process, strategy, and relationship,” of the first period cited articles (Factor 1a) positively loaded placed on the left-hand side of the map, cited articles (Factor 1b) loaded negatively placed on the upper right-hand side of the map. The main difference between these two groups is that they address the issues via a firm or subunits of a firm (Factor 1a) or competitors as different firms (Factor 1a). Consequently, these factors are named “coopetition at the micro level” and “coopetition at the macro level,” respectively. Positively loaded articles in Factor 2 called “relationship and nature of coopetition” placed on the upper center (Factor 2a). Factor 2b, including negatively loaded articles, emerges on the lower right-hand side. Factor 2a engages in relationships among small and medium enterprises as competitors. Factor 2b is related to alliances, social structure (embeddedness), and networks. In this respect, they are called “relationship in SME” and “relationship in networks.”

Insert Figure 3 about here

In the second period, one of the subgroups (Factor 1a) loaded positively of Factor 1 named as coopetition as strategic alliances placed on the right-hand side. Another (Factor 1b) loaded negatively placed on the left-hand side. Factor 1a is related to learning and innovation and relational capital in the strategic alliances. It is called “learning and innovation in coopetition.” Factor 1b emphasizes social structure, coopetition as an emergent strategy, and the multifaceted relationship in coopetition in one firm. In this respect, it is called “social structure of coopetition at the micro level.” Factor 2 is named “coopetition as relationship,” and has two subgroups, Factor 2a and Factor 2b. While Factor 2a is placed at the lower center and, positively loaded, deals with relationships between competitors, Factor 2b is placed at the upper center and, negatively loaded, focuses on strategic networks and the strength of weak ties. Accordingly, they are “relationship between competitors” and “relationship in networks.”

Insert Figure 4 about here

Finally, Factor 1a of Factor 1, named “relationship management” of the overall period (1997–2015) in Figure 2 was loaded positively and placed on both the upper and lower right-hand sides. Factor 1b, loaded negatively, of it placed on upper left-hand. Factor 1a is related to networks, the resource-based view, strategic alliances, relation capital, and innovation. It is named “relationship management at the macro level.” Factor 1b deals with coopetition in the units of a firm. It is called “relationship management at the micro level.” The subgroups of Factor 2, called “innovation with coopetition,” are placed on the upper left and right-hand sides (Factor 2a loaded positively) and the lower left-hand side (Factor 2b loaded negatively). Factor 2a emphasizes technological innovation; hence, this is called “technological innovation in coopetition.” Factor 2b is about networks, alliances, and balancing competition and cooperation. It is called “relationship management in innovation-related coopetition.”

Insert Figure 5 about here

Conclusion

This study vetted the evolution of the knowledge domain and the intellectual structure of coopetition. Data were retrieved from scholarly articles focusing on coopetition published before 2016 in indexed journals in well-known databases, namely Scencedirect, EBSCOhost, ProQuest, Wiley, Emerald, Sage, Elsevier, Taylor and Francis, and JSTOR. By utilizing citation and co-citation analysis coupled with factor analysis and multidimensional scaling analysis, the study provides specific conclusions, theoretical implications, and directions for future research.

First, the articles related to coopetition published in journals have a range of different scopes, including marketing, management and organization, innovation, operation management, international business accounting, and behavioral sciences. This indicates that coopetition is a multifaceted concept, as previously identified by Chin *et al.* (2008), Mina (2011) and Mina & Dagnino (2016). In this sense, coopetition is contingent upon other management disciplines and subdisciplines.

Second, this paper utilized co-citation analysis to identify and extend the understanding of the subfields of coopetition (Bengtsson & Raza-Ullah, 2016; Bengtsson *et al.*, 2016; Bouncken *et al.*, 2015; Dorn *et al.*, 2016; Gast *et al.*, 2015; Mina, 2011; Mina & Dagnino, 2016; Walley, 2007). The research findings suggest five subfields in the first period, seven subfields in the second period, and six subfields in the overall period. Furthermore, the researchers conducted MDS analysis to highlight the interrelationships of selected cited articles with other cited articles. In this analysis, additional subgroups for each period of Factor 1 and Factor 2 were explored. Based on the results of this analysis, all the factors are related to components of coopetition, which are relation, process, and strategy. However, the components dealing with relationship management and innovation as a strategy became increasingly prominent. This affirms that coopetition has emerged as a relation-based view of strategy, as indicated by Mina & Dagnino (2016). More research addressing process practices as a component of coopetition is needed. This research should focus on strategic management approaches, such as the resource-based view, behavioral strategy, the knowledge-based view, and strategy-as-practice. As a result, the coopetition literature is still fragmented and characterized by several diverse approaches. Additionally, the robust subfields generated by the analysis were super-positioned with low degrees. These subfields can help researchers design research proposals related to the coopetition literature. The case study approach dominated the literature (Bengtsson & Raza-Ullah, 2016; Dorn *et al.*, 2016). Consequently,

more research is needed to address the methodological challenges concerning current coopetition studies and the methodologies necessary for conducting possible coopetition research (Bengtsson & Raza-Ullah, 2016).

The research findings of the present study can assist researchers in analyzing subjects in a nuanced or in-depth manner, increasing knowledge about the subfields of coopetition. As reported by Bouncken *et al.* (2015) and Czakon *et al.* (2014) coopetition is more than a recognized concept, simple buzzword, or competition tool. This paper's findings suggest the presence of an active scientific community, including several subfields of coopetition (see Bouncken *et al.*, 2015; Czakon *et al.*, 2014). Furthermore, the concepts surrounding coopetition can enable companies to gain sustainable competitive advantages by providing them with numerous, tested solutions.

Two dimensions are evident in the generated subfields of coopetition: strategic and tactical. It may be a paradox (Chen, 2008; Zineldin, 1998; Lado *et al.*, 1997; Padula & Dagnono, 2007; Rusko, 2011) to find the balance between cooperation and competition among rivals (Robert *et al.*, 2007). However, this concept can be explained by several of the abovementioned theories. Coopetition represents a subfield of strategic management that may explain performance differentials between organizations while being placed within a framework of economic and behavioral theories. For instance, Czakon *et al.* (2014) highlighted the theoretical background of coopetition studies. These studies exploit theories stemming from alliances, game theory, the resource-based view, network theory, competition, and transaction cost economy. This paper's findings are not only consistent with these results but also offer additional insights. Generally, the coopetition literature has been dominated by the resource-based view of strategic management. However, rare and scattered discussions from the positioning school were found in the selected articles.

Coopetition based on a relation view (Dyer & Singh, 1998; Mina & Dagnino, 2016) can be seen as the third general perspective. It provides strategies for gaining sustainable interorganizational competitive advantages (Dyer & Singh, 1998) by keeping balance between cooperation and competition rather than competing with rivals via the protection of uniqueness (the resource-based view), the increase of bargaining power (the positioning school) or using coopetition as a tactic or strategy for following one or both of these approaches. One may argue that coopetition strategies may not generate an above-average return, as these strategies may be used to support strategies or complementary approaches (Bengtsson *et al.*, 2010). However, the resource-based and positioning views may not be sufficient to explain sustainable interorganizational competitive advantage in the long-term.

Czakov *et al.* (2014) illustrate patterns in the formulation of coopetition strategies, such as planning (deliberate) and learning (emerging) as process-oriented approaches. While the authors describe deliberate approaches as “intentional rent seeking at both individual and collective level, where cooperator’s actions are relatively clear or even announced” (Czakov *et al.*, 2014); they state emerging approaches as “the upsurge of unilateral rent seeking behaviors within cooperative settings, mostly unplanned before the cooperation start” (Czakov *et al.*, 2014, p. 134). However, the findings of the present research do not demonstrate any patterns in the literature regarding the development or improvement of coopetition activities, except at the intraorganizational level (Luo *et al.*, 2006), though Bengtsson *et al.* (2010) did acknowledge coopetition as a process. Luo *et al.* (2006) state that “the value of simultaneous cooperation and competition within cross-functional interactions lies in how they influence a firm’s market learning, which in turn affects the firm’s performance” (p. 76). This indicates that coopetition strategies should not always be formulated as deliberate strategies.

The present study has several limitations. First, the sample analyzed in this study was comprised of articles collected from well-known databases. Future studies may include other

databases. Second, to identify the subfields of coopetition, the researchers used only scholarly articles rather than books or proceedings. Future studies may include books and proceedings. Third, when assigning the subfields from factor analysis, the researchers considered the most prominent theme within an article, although many articles contained numerous themes or factors. Finally, the subfields identified may lead to research bias, as they were identified from similar intellectual content (Annareli & Nonino, 2016). This research also provides several avenues for future studies. First, the intellectual structure of coopetition may be examined by co-word analysis. Second, co-authorship analysis could demonstrate the social networks of the coopetition literature. Third, coopetition concepts may be disseminated throughout other disciplines. Finally, bibliometric analysis may also be utilized for coopetition studies to be published in the literature of emerging countries.

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Table 1**Definitions of coopetition**

Author(s)	Perception of competitor(s)	Level of competition and coopetition	Definition
Brandenburger and Nalebuff (1996)	A player is your competitor if customers value your product less when they have the other player's product than when they have your product alone	Interfirm	A mindset that combines competition and cooperation in the marketplace
Bengtsson and Kock (2000)	actors that produce and market the same products	Interfirm	A firm's simultaneously involvement in both cooperative and competitive interactions with the same competitor at the same product area
Tsai (2002)	Organizational units competing with each other to gain resources and competences that are embedded in intraorganizational networks	Interunit	Simultaneously cooperative and competitive behavior
Gnyawali and Madhavan (2001)	Organizations in similar product markets or value chain	Interfirm	Formalized cooperative relationships among competitors that involve flows of assets, information and status. Competition and cooperation may take place across different contexts (e.g., cooperate in a given product market and compete in others; cooperate in one value chain activity and compete in others)
Luo (2007)	Multinational enterprises in related product and market domains	Global (i.e. multinational enterprises)	The simultaneous competition and cooperation between two or more rivals competing in global markets. It implies the coexistence of cooperation and competition between the same global rivals, not cooperation with one rival and competition with another, and may occur at corporate, division, or subsidiary-levels. It also differs from a cooperative alliance between global rivals. Establishing an alliance with competitors emphasizes cooperation only.
Bengtsson, Eriksson and Wincent (2010)	-	Interfirm, Interpersonal and others	A process based upon simultaneous and mutual cooperative and competitive interactions between two or more actors at any level of analysis (whether individual, organizational, or other entities).
Bengtsson and Kock (2014)	Actors such as customers, organizations, network etc.	Interfirm, Intranetwork	Coopetition is a paradoxical relationship between two or more actors simultaneously involved in cooperative and competitive interactions, regardless of whether their relationship is horizontal or vertical
Bouncken, Gast, Kraus and Bogers (2015)	Actors such as individuals, organizations, teams and network	Interfirm, Interpersonal, Intranetwork	Coopetition is a strategic and dynamic process in which economic actors jointly create value through cooperative interaction, while they simultaneously compete to capture part of that value

Table 2
The frequency of articles related to coopetition by journal

Journals	n	%
Industrial Marketing Management	15	6.76
International Studies of Management and Organization	6	2.70
Technovation	6	2.70
British Journal of Management	5	2.25
Journal of Operations Management	4	1.80
Journal of World Business	4	1.80
Technology Analysis and Strategic Management	4	1.80
European Management Journal	3	1.35
International Journal of Logistics Research and Applications	3	1.35
Management Research: Journal of the Iberoamerican Academy of Management	3	1.35
Procedia - Social and Behavioral Sciences	3	1.35
Sustainability Accounting, Management and Policy Journal	3	1.35
Technological Forecasting and Social Change	3	1.35
Telematics and Informatics	3	1.35
Other Journals	157	70.72
Total	222	100.00

Table 3
Highly cited 50 journals (1997-2015)

Cited Journal	n	%
Strategic Management Journal	643	7.74
Academy of Management Review	416	5.01
Industrial Marketing Management	253	3.05
Academy of Management Journal	252	3.03
Organization Science	235	2.83
Administrative Science Quarterly	196	2.36
Journal of Marketing	195	2.35
Harvard Business Review	165	1.99
Research Policy	150	1.81
Management Science	142	1.71
Journal of Management	138	1.66
International Studies of Management and Organization	128	1.54
Technovation	125	1.50
Journal of Marketing Research	107	1.29
Journal of Business Research	83	1.00
Journal of Operations Management	78	0.94
Journal of Business and Industrial Marketing	75	0.90
Journal of World Business	74	0.89
British Journal of Management	72	0.87
California Management Review	71	0.85
Journal of Small Business and Management	65	0.78
Journal of Business Venturing	63	0.76
Journal of Product Innovation Management	63	0.76
American Journal of Sociology	58	0.70
Journal of Management Studies	56	0.67
Scandinavian Journal of Management	55	0.66
Organization Studies	54	0.65
Journal of International Business Studies	52	0.63
Long Range Planning	46	0.55
International Journal of Physical Distribution and Logistics Management	42	0.51
Journal of Management Inquiry	41	0.49
International Journal of Project Management	37	0.45
Journal of the Academy of Marketing Science	35	0.42
Sloan Management Review	35	0.42
International Journal of Entrepreneurship and Small Business	30	0.36
Entrepreneurship: Theory and Practice	29	0.35
European Journal of Operational Research	29	0.35
Entrepreneurship and Regional Development	28	0.34
European Journal of Marketing	28	0.34
Journal of Applied Psychology	28	0.34
Management Decision	27	0.32
MIS Quarterly	27	0.32
American Economic Review	26	0.31
European Management Journal	26	0.31
Industrial Management and Data Systems	26	0.31
American Sociological Review	25	0.30
Group and Organization Management	25	0.30
Marketing Science	25	0.30
Competitiveness Review	24	0.29
Managerial and Decision Economics	24	0.29
Total	4727	56.90
Other Journals	3581	43.10
Total	8308	100.00

Table 4. At Least 10 times cited articles in the coopetition articles

Code	Cited Article	Period					
		1997-2015 n=222		1997-2010 n=77		2011-2015 n=145	
		n	%	n	%	n	%
A1	Bengtsson, & Kock (2000)	112	50.45	29	37.66	83	57.24
A2	Lado, Boyd, & Hanlon (1997)	78	35.14	30	38.96	48	33.10
A3	Tsai (2002)	48	21.62	16	20.78	32	22.07
A4	Luo (2007)	46	20.72	5	6.49	41	28.28
A5	Bengtsson, & Kock (1999)	46	20.72	13	16.88	33	22.76
A6	Gnyawali, & Madhavan (2001)	43	19.37	16	20.78	27	18.62
A7	Walley (2007)	40	18.02	8	10.39	32	22.07
A8	Dyer, & Singh (1998)	38	17.12	13	16.88	25	17.24
A9	Padula, & Dagnino (2007)	37	16.67	4	5.19	33	22.76
A10	Hamel, Doz, & Prahalad, (1989)	36	16.22	20	25.97	16	11.03
A11	Gnyawali, & Park (2009)	35	15.77	-	-	35	24.14
A12	Khanna, Gulati, & Nohria (1998)	35	15.77	15	19.48	20	13.79
A13	Quintana-Garcia, & Benavides-Velasco (2004)	34	15.32	5	6.49	29	20.00
A14	Gnyawali, He, & Madhavan (2006)	33	14.86	8	10.39	25	17.24
A15	Luo, Slotegraaf, & Pan (2006)	32	14.41	7	9.09	25	17.24
A16	Hamel (1991)	31	13.96	13	16.88	18	12.41
A17	Gnyawali, & Park (2011)	30	13.51	-	-	30	20.69
A18	Ritala, & Hurmelinna-Laukkanen (2009)	28	12.61	-	-	28	19.31
A19	Eisenhardt (1989)	25	11.26	7	9.09	18	12.41
A20	Chen (1996)	25	11.26	9	11.69	16	11.03
A21	Gulati, Nohria, & Zaheer (2000)	23	10.36	11	14.29	12	8.28
A22	Bengtsson, Eriksson, & Wincent (2010)	22	9.91	-	-	22	15.17
A23	Dowling, Roering, Carlin, & Wisniewski (1996)	21	9.46	10	12.99	11	7.59
A24	Brandenburger, & Nalebuff (1995)	21	9.46	6	7.79	15	10.34
A25	Luo (2005)	21	9.46	7	9.09	14	9.66
A26	Chen (2008)	20	9.01	2	2.60	18	12.41
A27	Ritala (2012)	19	8.56	-	-	19	13.10
A28	Granovetter (1985)	19	8.56	11	14.29	8	5.52
A29	Chin, Chan, & Lam (2008)	19	8.56	4	5.19	15	10.34
A30	Dussauge, Garrette, & Mitchell (2000)	19	8.56	5	6.49	14	9.66
A31	Uzzi (1997)	19	8.56	9	11.69	10	6.90
A32	Park, & Russo (1996)	19	8.56	7	9.09	12	8.28
A33	Zineldin (2004)	18	8.11	5	6.49	13	8.97
A34	Bonel & Rocco (2007)	18	8.11	3	3.90	15	10.34
A35	Mariani (2007)	18	8.11	2	2.60	16	11.03
A36	Barney (1991)	18	8.11	10	12.99	8	5.52
A37	Morris, Kocak, & Ozer (2007)	17	7.66	4	5.19	13	8.97
A38	Rusko (2011)	17	7.66	-	-	17	11.72
A39	Gulati (1998)	15	6.76	7	9.09	8	5.52
A40	Afuah (2000)	15	6.76	8	10.39	7	4.83
A41	Levy, Loebbecke, & Powell (2003)	15	6.76	7	9.09	8	5.52
A42	Gomes-Casseres (1994)	14	6.31	5	6.49	9	6.21
A43	Oliver (2004)	14	6.31	3	3.90	11	7.59
A44	Tether (2002)	14	6.31	2	2.60	12	8.28
A45	Cohen, & Levinthal (1990)	13	5.86	7	9.09	6	4.14
A46	Peng, & Bourne (2009)	13	5.86	1	1.30	12	8.28
A47	Nieto, & Santamaria (2007)	13	5.86	1	1.30	12	8.28
A48	Das, & Teng (2000)	12	5.41	3	3.90	9	6.21
A49	Kale, Singh, & Perlmutter (2000)	12	5.41	4	5.19	8	5.52
A50	Lane, & Lubatkin (1998)	12	5.41	6	7.79	6	4.14
A51	Morgan, & Hunt (1994)	12	5.41	9	11.69	3	2.07
A52	Prahalad, & Hamel (1990)	12	5.41	5	6.49	7	4.83
A53	Luo, Rindfleisch, & Tse (2007)	12	5.41	2	2.60	10	6.90
A54	Osarenkhoe (2010)	11	4.95	-	-	11	7.59
A55	Wernerfelt (1984)	11	4.95	6	7.79	5	3.45
A56	Ahuja (2000)	11	4.95	3	3.90	8	5.52
A57	Jorde & Teece (1989)	11	4.95	7	9.09	4	2.76
A58	Das, & Teng (2000)	11	4.95	3	3.90	8	5.52
A59	Peng, Pike, Yang, & Roos (2012)	11	4.95	-	-	11	7.59
A60	Granovetter (1973)	11	4.95	5	6.49	6	4.14
A61	Kotzab, Herbert, Teller, & Christoph (2003)	11	4.95	2	2.60	9	6.21
A62	Chien, & Peng (2005)	10	4.50	4	5.19	6	4.14
A63	Fjeldstad, Becerra, & Narayanan (2004)	10	4.50	2	2.60	8	5.52
Total		1486		416		1070	

Table 5
Factors extracted for the period 1997-2010

Cited Articles	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
A24	.83				
A44	.80				
A63	.80				
A53	.80				
A47	.78				
A16	.72				
A55	.72				
A30	.71				
A45	.67				
A32	.66				
A3	-.66				
A50	.65				
A12	.64				
A36	.63				
A13	.63				
A35	-.62				
A43	-.59				
A25	-.55				
A5	-.50				
A15	-.44				
A1		.77			
A7		.74			
A49		-.72			
A56		-.69			
A37		.69			
A48		-.65			
A29		.64			
A28		-.63			
A31		-.61			
A60		-.59			
A41		.59			
A39		-.55			
A40			-.66		
A14			.64		
A57			-.61		
A23			-.61		
A20			.59		
A26			.58		
A61			-.57		
A4			.53		
A8			-.40		
A34				.64	
A9				.64	
A33				-.60	
A46				-.55	
A2				.50	
A42					.71
A6					.60
A19					-.58
A58					.51
A62					.50
Variance explained	11.46	9.59	5.69	5.24	3.81
Percent of total variance explained	20.84	38.28	48.63	58.16	65.10

Table 6
Factors extracted for the period 2011-2015

Cited Articles	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
A16	.85						
A48	.81						
A47	.81						
A50	.80						
A53	.76						
A44	.75						
A63	.71						
A56	.66						
A49	.65						
A30	.66						
A13	.63						
A23	-.59						
A11	.59						
A32	.58						
A20	.58						
A15	-.55						
A25	-.55						
A35	-.54						
A54	-.51						
A45	.50						
A3	-.49						
A43		.64					
A60		-.60					
A21		-.58					
A26		.57					
A42		.57					
A58		.56					
A22		.55					
A1		.55					
A46		.54					
A17		.53					
A29		.51					
A38		.49					
A9		.48					
A4		.46					
A5		.45					
A14			.80				
A12			.74				
A2			.68				
A6			.67				
A52			.52				
A40			.51				
A31				-.70			
A28				-.61			
A7				.53			
A36				.45			
A59					.60		
A39					.54		
A27					.48		
A24					.46		
A41						-.46	
A55						.46	
A19						-.44	
A34						-.43	
A37							.56
A33							.52
A61							.52
A57							.44
Variance explained	11.845	7.960	4.751	4.186	4.015	3.259	2.878
Percent of total variance explained	18.802	31.436	38.978	45.622	51.995	57.168	61.737

Table 7
Factors extracted for the period 1997-2015

Cited Articles	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
A16	.76					
A15	-.69					
A35	-.68					
A25	-.68					
A50	.68					
A48	.66					
A49	.65					
A45	.65					
A44	.64					
A47	.63					
A3	-.62					
A56	.60					
A5	-.57					
A23	-.57					
A36	.57					
A34	-.56					
A54	-.53					
A41	-.53					
A4	-.51					
A20	.46					
A24	.44					
A8	.41					
A11		.84				
A17		.72				
A13		.70				
A18		.69				
A53		.62				
A1		.62				
A63		.60				
A22		.59				
A38		.59				
A27		.58				
A46		.55				
A30		.54				
A7		.52				
A32		.50				
A51		-.49				
A43		.49				
A10		-.47				
A57		-.47				
A21		-.46				
A42		.44				
A52		-.43				
A29		.42				
A40			.66			
A31			-.61			
A28			-.48			
A12			.45			
A2				.58		
A26				.58		
A6				.54		
A14				.51		
A9					.55	
A39					.49	
A37					-.45	
A55						-.61
A19						.54
A33						.45
Variance explained	11.323	10.265	4.314	3.911	3.223	2.751
Percent of total variance explained	17.973	34.266	41.115	47.322	52.437	56.804

Figure 1
The frequency of articles related to coopetition by year

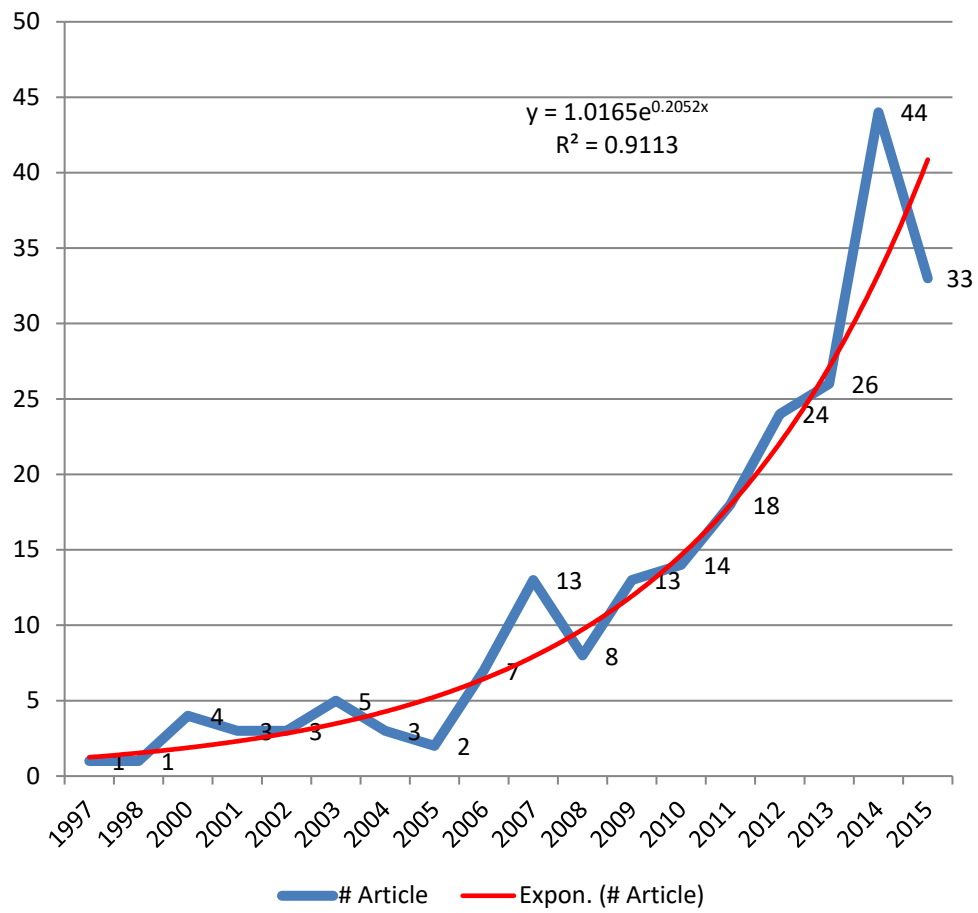


Figure 2
Changes in impacts of cited articles between 1997-2010 and 2011-2015

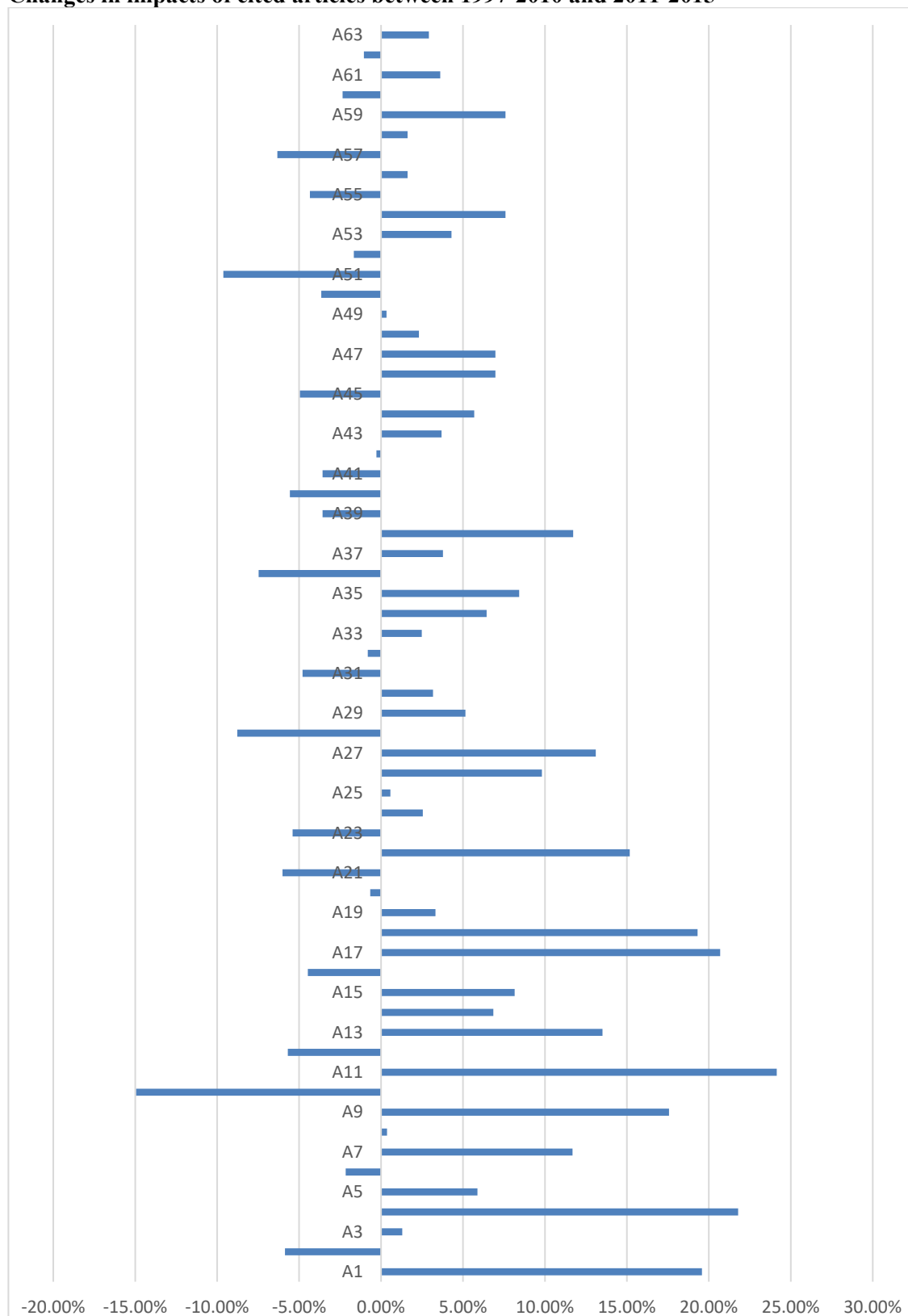


Figure 3
Multidimensional scaling - first period (1997- 2010)

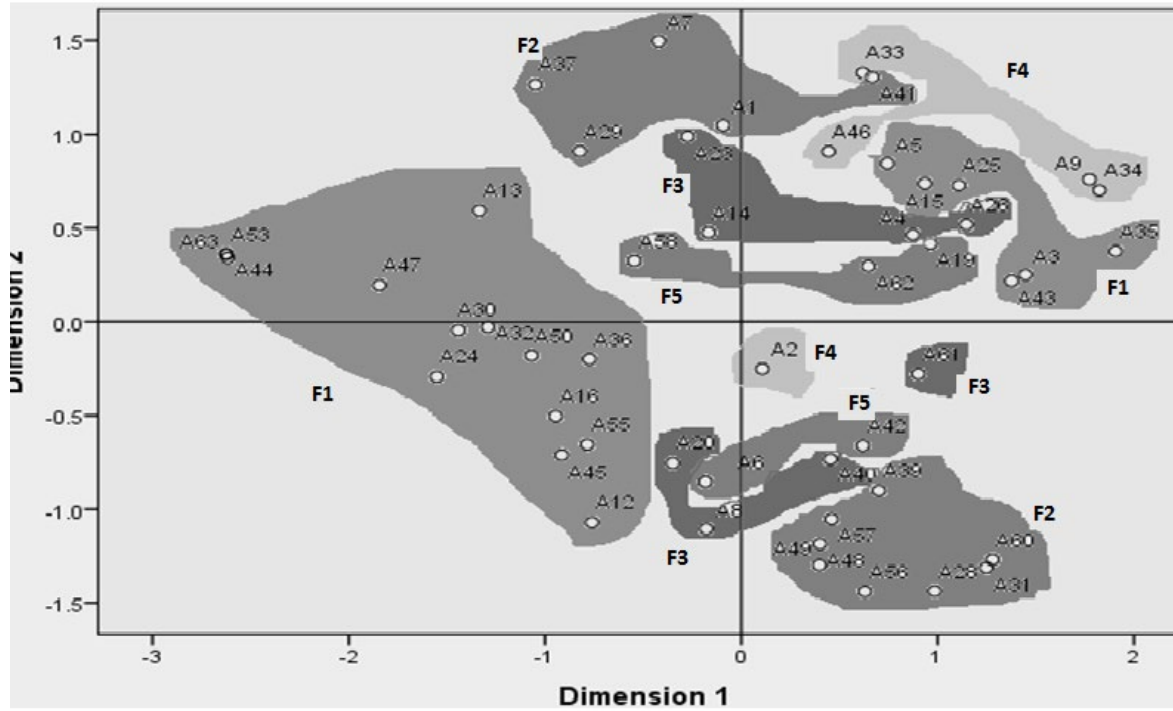


Figure 4
Multidimensional scaling - second period (2011-2015)

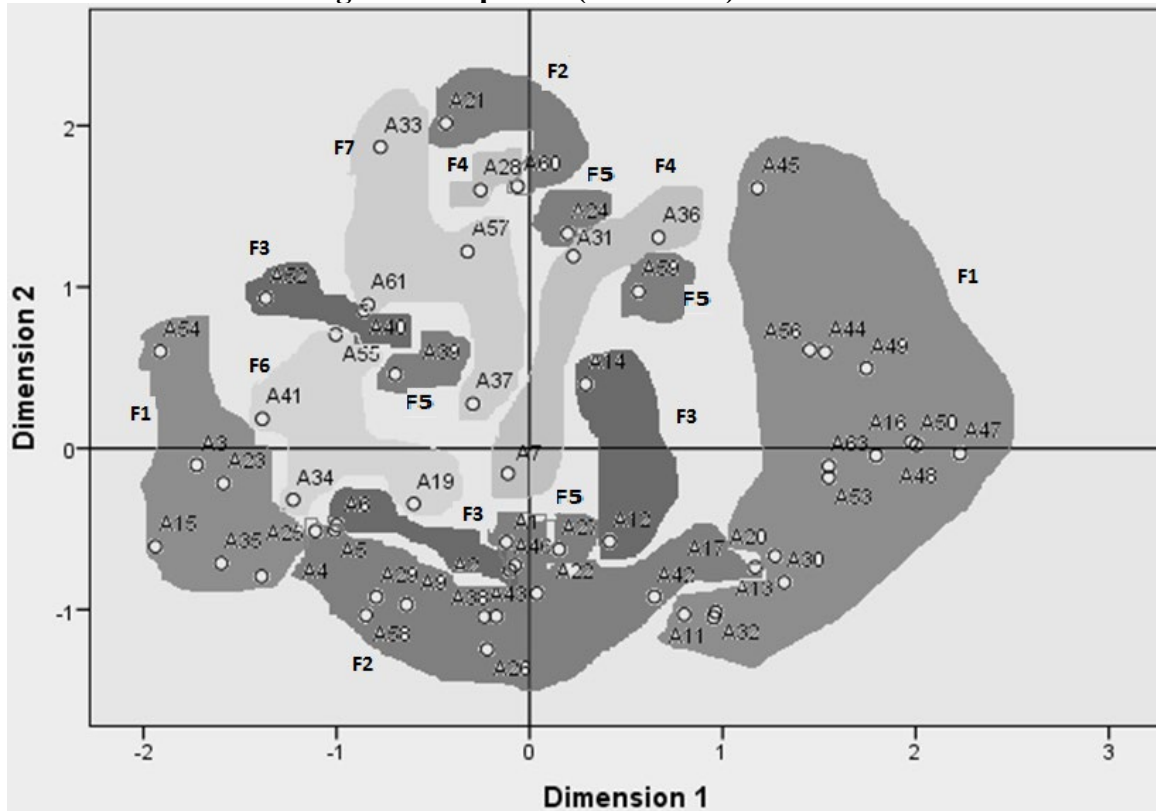


Figure 5
Multidimensional scaling - overall period (1997-2015)

